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EDITOR & PUBLISHER: WALTER KING. OFFICE: 11, BOLT COURT, FLEET ST., LONDON.

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EDITORIAL NOTES.

Price of Coal (Limitation) Bill.

WHEN the Price of Coal (Limitation) Bill was brought by the President of the Board of Trade before the House of Commons yesterday week for second reading, there was naturally some amount of snarling from one section of the representatives of the coalowners. But in contrast with this, the prolonged debate was distinguished by a very general sympathy, from all other quarters of the House, with the intentions of the Bill. The dissentient spokesmen for the coal interests were shrewd enough, long before the end of the discussion, to see that the great body of opinion in the House was distinctly in favour of regulation, and that they might just as well attempt to blow up the fabric of the British Constitution as try to override the solid legislative judgment that it is unsafe to allow trading in the native and fundamental commodity, coal, to be left unconditionally during the war in the hands of those who have not shown that regard for British interests which unity of purpose in the settlement of the most momentous issues that have ever faced us as a nation should have made the actuating incentive in their dealings. There are two sections of coalowners sitting in the House; and they are also representative of the opinions that exist among the coalowners outside. One section would prefer to see the Bill destroyed (or alternatively a tax imposed on war profits); the other section are among the most ardent supporters of the aims of the measure, and are even critics of it in that, in their opinion, it should be extended to coal sold to our Allies (but the question of fluctuating exchange comes in here) and to the merchants who deal with small consumers. There were cynical things bandied about from the one section to the other; and the owners had a shot at the merchants, and the merchants at the owners. Neither the opposing owners nor the merchants confessed to having been making undue profits; but the one thought the other had been doing so, and candidly said as much. By the disinterested members, salt was not applied in grains, but in pounds, to some of the statements made; and the smile incredulous was almost universal while the wordy warfare proceeded.

The lead in opposition was taken by Sir Joseph Walton, who at first sought the complete destruction of the Bill, but withdrew his amendment after hearing the statement of Mr. Runciman, and after having had a pretty clear indication from the House that he was championing a forlorn hope. One ground on which Sir Joseph, staunch defender of untrammelled liberty for the coalowners, opposed the Bill was that it applied to only one industry, and left other great industries which are netting huge war profits to go scot free. He made a special point of dragging in the gas industry as an illustration, which was a blunder, and which shows one of the penalties that the industry has to pay for its lead against the war being made an excuse for burdening the country through the chief native product. Other industries may have made considerable special profits owing to the war; but the gas industry is not one of them. The industries that have made war profits have the genial assurance of the President of the Board of Trade that the Chancellor of the Exchequer already has his eye on them, and is going to see that the country has a picking out of these profits. Sir Joseph Walton referred to gas companies as making big prices out of coke, and out of substances that the Government require for munition purposes. On the latter point, the Government knows better than Sir Joseph that the gas undertakings of the country are behaving very handsomely and very patriotically in this matter, and that comparatively little expense is falling upon the country through the application of the simple process of extraction devised by Mr. Charles Carpenter, D.Sc.; the gas undertakings only securing from the tar distillers the additional value of their tar, or at all events should do so. As to the higher price of coke, it is a good thing for the gas consumers that this has been obtained, or their position would have been very much worse than it is through the price of coal and the costs incurred in freight and delivery of coal on to the works.

War profits in the gas industry! The very idea raises a contemptuous smile for those who, like Sir Joseph Walton, take a survey from the outside, and, knowing little or nothing of the actual facts inside, draw wrong conclusions. The strongest possible comment on Sir Joseph's speech was furnished a day or two later by the announcement of the Directors of the Gas Light and Coke Company, that they propose to pay a dividend for last half year at the rate of £4 4s. per cent. per annum, less income-tax, compared with £4 17s. 4d. a year ago. It is true some gas undertakings are still receiving coal under pre-war contracts. A point was made of this; and it was alleged that this coal was being supplied by coalowners at a loss under current conditions. The argument might appeal to some who do not know the whole chain of circumstances, but not to those gas administrators who, through non-delivery under contract owing to the "scarcity" of coal for the purpose, had last winter to buy in the open market (in which curiously enough there was not the same "scarcity") and from which they could satisfy their requirements at heavy prices, which put a substantial profit in someone's pocket. There were, of course, gas undertakings that suffered from the difficulties of transport and freight rates. But all of them would much rather have had, at the proper time, the coal due to them under their contracts than have had to suffer the expense and the anxieties in which they were involved. It is also true that many are now receiving excellent supplies of coal under unexpired and new contracts, thanks not to voluntary special efforts of coalowners (of course, not speaking inclusively), but to the operations of the Coal Exports Regulation Committee, the Chairman of which, Mr. Russell Rea, stated that the principle that is guiding the Committee is the Englishman first, and the foreigner second. The coalowners will see from this that their best policy is to work so as to satisfy all the requirements of this country, under the Price Regulation Bill, and then the Exports Committee will deal more leniently with them, when proposed overseas business is not suspect in the matter of benefit of any kind for enemy countries. Mr. Rea, it will be seen from our report, gave figures which showed the increasing quantities the London Gas Companies are now getting into store as a protection against next winter. But there again the coalowners do not appear to recognize that the cost of putting coal into store, and taking it out again for gas-making purposes, is heavier than working direct from incoming coal.

There was talk, on the part of Sir Joseph Walton, about the principles of free trade. But one has only to read the Departmental Committee reports that have been issued as to the coal trade of the country to know that in it the principles of free trade are more honoured in their breach than in their observance; and to those identified with such a large coal-consuming industry as that of gas supply, the reports were not required to enable them to arrive at the same conclusion. The old point was made that the profits of the coalowners are more visionary than real; and so ardently is this point pursued and emphasized on every possible occasion, that a credulous individual might be excused for wondering why it is the coalowners have not long since found their way *viâ* the bankruptcy courts into the workhouses of the country, and left the business of coal getting and dealing in the hands of others who would eventually succeed to their same miserable condition. Of course, one knows about the variation in working costs between different collieries, and that some are more profitable than others. But the coal question is one that can only be dealt with as a whole. Mr. Runciman gave a basic figure for computation when he pointed out that, on the home consumption of coal, 1s. per ton increase in the selling price means £9,250,000; and this, multiplied by

the shillings increase, represents a startling sum to fall as a burden upon the entire community and upon the manufactures of the country. There are people who participate in the additional profits, after deducting increased expenses. Who are they? The coalowners say they have not had the extra profits; and the coal merchants repudiate the charge of having fingered them. They have simply vanished into thin air, though the country has paid in hard cash. It is a phenomenon of the first order. But there it is.

Now the Bill proposes that 4s. per ton shall be fixed as the standard addition to the prices of 1913-14 to cover, with a margin, the additional expenses put upon the colliery owners by the war. It was surprising the coalowners did not make something more than a feeble attack upon this figure. Their difficulty was that they could not safely do so without committing themselves to unprovable assertions. Mr. Runciman figured-out generously the increased costs. The war bonus to the miners—the 15½ per cent. in the federated area, the 18¾ per cent. in Scotland, the 17½ per cent. in South Wales, and the 15 per cent. in Durham—represents an average increase of 1s. per ton throughout the country; the cost of materials (pit props, &c.) another 1s.; and the reduced output means greater establishment charges, &c., per ton of coal. The total is about 3s., leaving 1s. as a margin to cover exceptional cases. This is liberal—too much so says Sir Arthur Markham. He went further than this, and described (from his experience as a coalowner) the 3s. as nonsense, and said, if the amount were cut in two, it would be nearer the truth. Anyway, it is beyond dispute that the Bill proposes liberal treatment; and when the Committee stage was reached on Thursday a strong effort was made to reduce the 4s. to 3s. This was firmly resisted by Mr. Runciman on behalf of the Government. There is the question as to the base prices upon which the 4s. is to be placed—prices ruling during the twelve months preceding the war. It will be difficult, despite fines, to get them properly fixed; but though an endeavour was made in Committee to settle safer lines in this regard, no other course was found which was acceptable. There was a great deal of argument as to whether the pithead prices should be the basis of regulation or the prices to the consumers. This referred principally to household coal; and Mr. Runciman described the difficulties of getting away from the pithead. Sir Joseph Walton and his followers, too, would have liked to see the Bill limited to household coal; but the dependence of the community upon the manufacturing industries of the country also put this out of court.

There was one important concession made during the Committee stage, although the point affected was hardly touched upon in the debate on second reading. It was that, on an amendment, which proposed to make the measure retrospective (but which was rejected), Mr. Runciman admitted that he thought a case had been made out for giving corporations and public utility companies some relief from any heavy priced contracts entered into before the introduction of the Bill. The contracts of the Glasgow Gas and Electricity Departments were cited as examples. The President promised that the Government would consider the matter before the report stage of the Bill was reached, which looks hopeful for those gas undertakings which have paid in excess of the 4s. over 1913-14 prices. But this will not affect contracts for coal for household and other purposes.

The second reading went through without a division. The Committee stage passed with few amendments. This all speaks volumes. The Bill, and the manner in which it is being accepted, indicate that there are those in the coal trade—not all, but not a few—who have forfeited public confidence, and that it had become necessary for the Government during the remainder of the war to protect the country against further excesses.

The Gas Industry and "Essential Work."

We are somewhat doubtful whether the Government Departments concerned with the recruiting of men for the Army and Navy and for securing volunteers for munitions work are fully conscious of the part that the gas industry is taking in provisioning the Army and Navy with first essentials to their work. If they do so appreciate the position, then it might surely receive expression by a larger and definite recognition of the fact that the gas industry cannot continue its services with the same efficiency and to the same degree, if robbed of any more of its men.

Voluntarily, the industry gave up, to the last man, all those who could be spared, wished them God-speed and a victorious issue from the world-racking struggle, and made monetary provision so that the dependants of the men should not suffer any privation by their absence, and the men themselves should not be worse off by going to defend national honour and home. This was all before there was complete recognition of the fact that the country was short of munitions of war, and that the gas industry would be called upon, as part of the great national machine, to contribute light, heat, and energy to many more factories that were to be turned on to the production of additional munitions of war, and before it was known that the gas industry would attain such an important position as the provider of toluol for high explosive purposes. The gas industry is in truth busily engaged on Government work; but unfortunately for the defence of its labour in keeping things going properly, the work is of an indirect, though essential, order. This being so, the industry has failed to obtain a satisfactory undertaking as to further recruiting. Now comes the National Registration Act, as well as the call for munitions volunteers. Gas workers are just about the sort of men who are valuable for munitions work; but the factories making munitions of war want light, heat, and power. The work also requires toluol, sulphuric acid, and other derivatives from the secondary products of gas manufacture. It is therefore important that the working and productive efficiency of gas-works should not be further impaired. If this could be impressed upon certain Government Departments, the forthcoming National Register would be a great benefit to the gas industry, as an aid to discrimination on the part of the departments. The industry has been quite willing to spare all the men possible; but there is a limit to deprivation if safety is to be assured.

The matter has again been raised by Mr. Walter T. Dunn on behalf of the Institution of Gas Engineers—this time with the Munitions Enrolment Committee. In view of the depletion of the ranks by enlistment, it was asked that gas workers and gas-plant makers should be immune from enrolment as munition workers. But no such general undertaking, it was said, could be given. There are, however, rays of hope in the reply received by Mr. Dunn which is printed in a later column. One is that not all men enrolled as munition workers will be transferred from their present employment; and another is (this is highly important) that an opportunity will be given to the employer to state, for the consideration of the Minister of Munitions, whether or not a man is engaged upon Government or *other essential work*, or to submit any other reasons which, in the employer's opinion, render it desirable in the national interests that the workman should not be transferred from his existing employment. Most gas-works managers will be able to show that the men remaining with them (some of whom are not so skilled as those who have already left for military and other national service) are engaged on "essential work." So long as gas managers are given the opportunity of showing cause why they should not be deprived of the services of more men, they will not have so much cause for complaint; for, in regard to most gas-works, an excellent case can be made out to-day. It can be taken for granted now (unless a fresh pronouncement is made) that there will not be universal exemption for the gas industry, any more than for other industries. The line seems to have been definitely drawn at Government and "essential" national work; and the War Office, the Admiralty, and the Munitions Department are not disposed to limit the area from which they can make drafts by pushing the exempting line further outwards.

Gas-Works Products Now and After the War.

During the war, the primary and secondary products of coal carbonization in gas-works have made several new developments as ministers to the service of man and of the nation; and when these developments are assembled, and are viewed in the aggregate, they present something much more substantial bearing upon the future of the gas industry than if viewed individually. At the annual meeting of the European Gas Company (reported in our news columns to-day) Mr. H. E. Jones referred to this matter. He sees the gas industry acquiring quite a new position—largely through the war—in both the commercial and the political worlds; and the unquenchable optimistic temperament tells us that, through what has occurred, in every way the residual products of gas-works are going to be better known and better understood, and inure to the advantage of gas

manufacturers to a greater degree than ever before. We believe this is right. Temporarily some of the gas business here and there has been lost through restrictions, enforced economy, and higher prices; but, generally speaking, no one can examine the situation without seeing that in various ways the war has been the means of creating (as Mr. Jones puts it) a "new position" for the gas industry.

There is gas. Through the war it has been brought into use in unparalleled measure for heating furnaces and other appliances in industry. In new factories and in extensions of factories in which war materials are produced, and in converted factories for the purpose, gas furnaces and other appliances have been introduced of all types and in a large range of capacity. All the new experience that has thus been gathered is not going to cease to be productive with the close of the war. The men who have had experience of the conveniences and time economies of gas heating during the war will find new applications for it in the work upon which they are engaged in normal times; and their experience is not going to be locked up in their factories, and find no outlet into other branches of industry. Then as to coke. The experience there has been with it during the war is going to advantage it afterwards. There is distinct evidence of this. The distribution and the available supplies of coal about the country are considerably better than at the time during last winter when there was a raid on gas-works for the first of the secondary products. But still gas-works have no cause to complain of the business that is now being done in coke. This is a good sign. At the same time the efforts to increase its demand for steam-raising, for hot-water supply in bulk, and for other domestic and industrial uses must not cease. In the largeness of demand is safety for the future; and no gas man wishes to again see those gloomy-looking coke-heaps that had increasing bulk week after week preceding the war. Sulphate of ammonia, too, owing to the war, is a good line, through the restriction of supply, owing to the doors of Germany being under our guardianship. But sulphate of ammonia will be a danger spot after the war. Sentiment, or hatred of the inhuman war methods of Germany, is not likely to alone affect overseas sales of sulphate of ammonia; that sentiment and hatred must be supplemented by well establishing ourselves now in the matter of good quality, as advised in the article in last week's issue, p. 124. There are makers who refuse to be persuaded of this. They must take the consequences, though in the *post*-war interests of the whole of the makers their conversion is a *desideratum*.

Last, but by no means least, there is what Mr. Jones calls the "romance" of tar. Tar has had a career which fully justifies the application of the term. At one time of day, gas-works were talking of burning the product for steam-raising and retort-heating, owing to the price realized being no better than, if as good as, its fuel value. Then came the vast requirements (which are not so vast at the moment owing to the withdrawal of the Road Board's financial contributions during the war) for road surfacing and making purposes; and the position of tar improved, and a better revenue was derived from it. Then the war, and the coming of the demand for the necessary tar products for making the extreme opposites of dye-stuffs for the peaceful purpose of beautifying and of high explosives for destructive uses. The sequel of treating, at normal temperature, gas by tar was told in the article in last week's issue on "The "Market Value of Light Oils and Other Constituents of "Tar." The pecuniary advantage of the system was shown by comparing the quantities of, and the revenue from, the derivatives of 100 gallons of crude tar, and 100 gallons of tar which had been enriched by contact with gas. Under the conditions explained in that article, a substantial addition to the tar value was shown by the process; and such an addition that the treatment may possibly be introduced as a permanent one if the outstanding question for definite settlement—the effect on the composition, and on the utility to consumers, of the gas itself—comes out on the right side. Then there is the trouble regarding pitch. This might be profitably disposed of to a greater extent than it is by—utilizing with it coal and coke dust—producing a briquette fuel which would have a ready sale in these days of high priced coal. Further, sulphur is in good demand owing to the price and market conditions of sulphuric acid. In all ways, the outlook for both the primary and secondary products of gas-works in the *post*-war days is promising, if only proper advantage is taken of current opportunities, and our new gains, to use a military phrase, are thoroughly "consolidated" so that they may continue to be held. The residual products of gas-works are not only "going" to be better known and better understood, they are now better known and better understood than when the war started, and are becoming increasingly so day by day. This is all to the advantage of gas manufacturers; and Mr. Jones's optimism in this connection is fully justified by the march of events.

Incandescent Lighting and Calorific Value.

A WELL-MEANT contribution has been made by Mr. Robert Ffrench Pierce to the "American Gaslight Journal" on the subject of the composition of gas in relation to the performance of the bunsen burner. The main idea of the author, it appears to us, is to offer proof, from experiments conducted by himself with an incandescent burner and gas of varying qualities, that a high calorific power gas is unnecessary, and, in fact, is undesirable, for incandescent gas lighting, and that a reasonably lower calorific power will give the consumer better lighting value, other conditions in regard to the gas being favourable. That is now an accepted truth. But Mr. Pierce is not satisfied with occupying this ground. He goes further, and makes some sweeping assertions to which it is impossible to subscribe. There is no need to be hypercritical over phrases, such as those in the article referring to flame temperature, as though, in their nakedness, they are not so perfect in lucidity as they might be, what Mr. Pierce is generally aiming at is quite apparent to any student of the subject, notwithstanding that he goes astray somewhat in asserting the beneficial effects of high flame temperature in all processes.

The conclusions that Mr. Pierce draws from his investigations are really the important matters, as it would not aid in our industrial progress if all his deductions were commonly held. They are, in short, so sweeping that there does not appear to be, in his mind, any safe standard of quality for gas, or any standard that has intrinsic value. We cannot agree. There must be a standard of some sort; and the calorific power one is the best obtainable for adjudging gas value for all purposes, without entering into complications of an (for a standard) undesirable order. In fine, calorific value is the premier requirement. But calorific value standing alone is not, and no one would say it is who knows what he is talking about, an absolute measure of value. Composition is highly important in conjunction with calorific power to effective work. "For the present," says the author, "we "can say that gas candle power, specific gravity, or calorific "value are not of the slightest value either in predetermining "the value of a lamp or in fixing standards of service for "gas lighting." Again, "for at least 50 per cent. of the avail-"able gas business in the United States, the calorific value "standard would be as useless, meaningless, absurd, and ridi-"culous as the present candle-power standard." This is going too far. There is no function in which gas is employed in which calorific value has not some concern. If in conjunction with calorific power testing, a specific gravity record is taken, this will supply some indication as to the carbon dioxide and nitrogen content of the gas—whether or not these are increasing or decreasing. With increase, too, in calorific power, there should be an increase in specific gravity. In view of the effect that carbon dioxide and nitrogen have upon flame temperature, seeing too that the greater quantity of air required for producing perfect combustion of the high qualities of gas means the introduction of a larger volume of nitrogen, which runs off with heat units, and thus depreciates flame temperature, we cannot agree with Mr. Pierce in his sweeping assertions in regard to calorific value and specific gravity tests in relation to incandescent gas lighting. They have considerable value, and are a guide to the production of suitable gas which will supply the consumer with the commodity that, with attention to the regulation of his incandescent burners, will give him high flame temperature.

There are other conclusions in the paper bearing upon cost in relation to calorific power with which there must be disagreement. It cannot be admitted, for instance, that the cost per candle-power-hour of producing light in the incandescent burner is independent of the calorific value of the gas. It is not. And it is a curious argument that "so far "as incandescent lighting is concerned, it does not make the "least difference to the customer whether he pays $1 per "1000 cubic feet for gas of 480 B.Th.U. or $1 per 1000 "cubic feet for gas of 660 B.Th.U." It does. But the aim of the gas industry on this side has been to arrive at

a calorific value that will be generally useful for all purposes, and to give as many B.Th.U. for a penny as possible. It is found that this can be done with what is termed a low grade gas; and such gas as Mr. Pierce agrees is best for the consumer, although he does not explicitly explain the reason, but only shows the effect by the results of his tests. Given equal manufacturing and business conditions, a gas of 480 B.Th.U. ought to be sold per 1000 cubic feet at a lower price than the less serviceable 660 B.Th.U. gas—less serviceable because the mechancial work associated with the combustion, by means of a bunsen burner, of the higher grade gas produces a depreciated result in proportion to the B.Th.U. expended.

A German Belief, and the Truth.

The German and the Dutch Gas Associations have held their annual meetings, with curtailment of the customary programme. Interesting summaries of the proceedings appear in other columns. The President of the German Association seems to have been somewhat at sea as to the origin and purpose of the present war. He thinks it was born of "envy and jealousy" on the part of the enemies of Germany; those enemies have very good grounds for believing that the origin of the war is to be found in the ambition of Germany for supremacy in the world, and that this supremacy was to be gained by force of Prussian militarism, supported by the preparations of several years for this express object. In short, Germany adopted the doctrine of might over right; and, in trying to secure ascendancy, it also adopted the most barbarous and cowardly methods of warfare—including the bombarding of undefended towns, the killing of civilians (including women and children), air raids over similar towns with like consequences, the sinking by submarines of unarmed vessels, and the drowning of hundreds of civilians—men, women, and children—of all nationalities. Hideous cowardice and cold-blooded murder have been introduced as methods of warfare by the nation who, in the words of the President of the German Association, say that "the purpose of their enemies" is to destroy "German culture." If those things which we have mentioned be of "German culture," then the sooner that part of the "culture" is destroyed the better. When humane Germans are again able to look with full eye into the outer world, and learn the whole truth of certain of the doings of the German authorities and their instruments, we should imagine that they will turn with loathing from those who have been responsible not only for the war, but for acts of the most diabolical and revolting kind.

Prisoners of War in Gas-Works.

In Germany, prisoners of war are not kept without employment; and if reports be true that reach this country, British prisoners of war are awarded, because this country is the most hated, the worst jobs that are going. German "culture" ought to be accompanied by justice. There are prisoners of war employed in German gas-works; but these appear to be Russian or French. From what we know of German gas engineers, they are not the men to engage in any form of savagery against men unfortunate enough to be prisoners of war—such savagery as has been reported in certain instances. The emoluments of these poor fellows are extraordinarily lean. After all deductions are made, one gas manager admits that the balance of wages, in the case of the prisoners at his works, only amounts to 7½d. per week. It is found that the prisoners of war are responsive, in the way of an increase in work, to small additions to their wages. It transpired, at the meeting of the Dutch Association, that the Council have entered into an arrangement with the French Society to act as intermediaries between French gas workers who are war prisoners in Germany and their relatives in France. We have made use of German interned vessels for the transport of coal to gas-works; but we have not sought German prisoners of war to assist in the work of carbonizing the coal.

Coal Exports and Germany.

The regulation of our exports of coal has had a considerable effect upon the coal situation in neutral countries; and now for their own protection those countries have to look to the conservation of the supplies of which they can obtain possession, as well as (at any rate, in Holland this is being done) make systematic provision for hoarding-up reserves for possible worse times. These countries cannot now spare Germany any of the fuel landed on their shores. There is no room for the slightest doubt that a considerable amount of coal that left this country prior to the appointment of the Exports Regulation Committee was destined for Germany, *vid* neutral countries; and coalowners and shippers must have been well aware of the fact, for there was then no other reason why there should have been the bound upwards in exports to near Continental neutral countries in close touch with Germany in the early part of the year. There has been dead-silence on the part of the coalowners and the coal papers regarding the article on this subject which appeared in our columns on the 6th inst. It is a matter that they prefer to leave severely alone. This does not apply only to the more northern coal-fields. The "Coal Merchant and Shipper" the other week showed that substantial additional quantities of coal were shipped from the Nottingham and Derby coal-field in the early months of this year, compared with the corresponding period of last year. The case expands for a thorough investigation of this matter, with the view of ascertaining whether there has been any known direct or indirect trading in coal with the enemy as well as (as a recent Scotch case proved there has been) in iron ore.

The German Government Method.

Since the tighter hold over coal exports in this country—probably as a consequence of it—a change of a very significant character has come over the coal situation in Germany. The German Government do things differently from our own Government. If they make up their minds to do a thing concerning a domestic matter they do it, and without a great wordy warfare and dealing with a mass of formal preliminaries. Not many days ago, great surprise was created in Germany by an official announcement that the Government had decided to assume control of the whole coal industry; and simultaneously publication was made of a cut-and-dried scheme. This stated that the owners were forthwith to be brought together by compulsion in associations which are to control the entire coal production and sale of coal; and no consent of the coalowners was to be sought. The German Government hold that economic upheavals through fluctuating coal prices must be prevented by all possible means during the war and for years after. Our Government have now been brought to the same way of thinking; but they have taken a more circuitous course in dealing with the matter.

The South Wales Settlement.

There were two events last week in connection with the coal industry which were of national importance. The one was that a settlement was arrived at over the wages agreement between the South Wales coalowners and miners, which sent the latter back to their duty after quite a working week's absence, and the other was the second reading in the House of Commons of the Limitation of Coal Prices Bill, which is dealt with in earlier columns. We will not enter into the questions that led to the lamentable stoppage of work in the South Wales coal-field; but the events from beginning to end constitute a piece of mischievous business over which both masters and men ought to be thoroughly ashamed of themselves for having shared in it while the nation are engaged in the most perilous and far-reaching war in the history of the world. Blame attached to both sides; and the settlement only shows what could have been done earlier, without any interruption of work, had the owners been so minded. The new wages agreement is to last during the continuance of the war and for six months after; and this is practically the only point which the men failed on, seeing that they wanted a three years' agreement. But in all other respects, the agreement is almost identical in terms with that recently made in the English federated mining area. The new standard wage and the minimum are exactly similar; the important difference being the inclusion of all surface workers in the agreement. When these points are considered, while no language would be too strong for use in condemnation of the action of the men in leaving work under the circumstances, the owners deserve equal censure for putting the country in such jeopardy by not sooner agreeing to the terms to which there had to be ultimate submission, and which terms so closely harmonize with those already existing in the federated area.

A Central Radiant Heat Distributor.

There is no question that, if considered only from the point of view of room heating, and not from that of general convenience, the conventional location of the fire in a room is altogether wrong. It is wrong to have it at one end of a room, and expect it from that situation to equally raise the temperature in all quarters of the room. In that situation, with its back to the wall, it can only have one radiant face. But the situation has been primarily fixed by the necessity of having a chimney running up the side or the party wall. Of course, it would not be convenient to have a central fire in small rooms; but a central fire in a room, with a radiant face all round—the degree of radiancy being regulatable at will—would be, where room convenience and use permit, the ideal means of heating. The radiations would be brought into more equable relationship with all the walls and articles in the room, and so heating would be more uniform. On cold winter evenings, there would be no necessity to pack the family round a single faced fire at one side of the room. There would be freedom to sit where one pleased, and feel the cheerful rays from the centrally placed fire. But there are large interiors—halls, hotel and club rooms, hospital wards, workrooms, libraries and reading-rooms, school-rooms, waiting-rooms, and many other places—where such a fire could be appropriately arranged. We have been wondering a long time whether a radiant fire for central heating would ever be produced in which gas would be the fuel; and there was therefore pleasure in noticing last week (p. 127) the gas-fire Messrs. R. J. Rogers and W. E. Cadwallader have invented, and which gives a circular grouping of radiants, and so a circular radiating surface. This fire is as complete a departure from the ordinary gas-fire as one could desire; and the proportion of metal work to radiating surface is by it considerably reduced compared with ordinary patterns. There ought to be a big demand for the new fires. We can see the Home Office inspectors of factories and workshops taking such a fancy to them as to recommend them in place of flueless radiators. These new central fires require a flue; and a japanned iron one, or a galvanized iron one painted outside, is recommended. We do not see why ingenuity should not provide something more presentable, so that the circular fire could be used in places superior to those in which an ascending painted metal flue is permissible. We like the idea of this fire; and there ought to be an early embarrassing demand upon the makers for it.

Gas Light and Coke Company's Dividend.

The Secretary of the Gas Light and Coke Company (Mr. Henry Rayner) states that the accounts of the Company for the past half year show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend the payment of a dividend at the rate of £4 4s. per cent. per annum, carrying forward to the next account the sum of £436,058.

South Metropolitan Gas Company.

Mr. F. M'Leod, the Secretary of the South Metropolitan Gas Company, writes to say that the accounts for the half year ended June 30 last show that (subject to audit) the balance to the credit of the net revenue account will enable the Directors to recommend payment of the statutory dividend at the rate of £4 8s. per cent. per annum, and carry forward to the next account the sum of £4791.

The Otto Coking Company, of New York, have secured a contract for erecting benzol apparatus in connection with the by-product coke-works of the Citizens Gas Company of Indianapolis. It is specified that the benzol addition shall be in operation in ninety days.

Gas Supply in Long Island.—Large extensions of the gas and electric systems of Long Island have been approved by the Public Service Commission of the State of New York. The Nassau and Suffolk Lighting Company have been authorized to spend an additional half-million dollars and more on extensions and improvement of their gas plant, in various districts. The proposals of the Company are to build a new generator-house, machinery-house, governor-house, meter-house, and laboratory. They will also provide a street-lamp service for 1000 lamps, a new main (2000 feet long) across Great South Bay, an artesian well, and numerous new machines and engines for the manufacture of water gas. In addition to all this, the Company are laying 400,000 feet of 4-inch and 220,000 feet of 2-inch main. The Public Service Corporation of Long Island have been authorized to expend the necessary capital on the provision of 300,000 feet of 4-inch and 200,000 feet of 2-inch mains, 1000 new service-pipes, and 500 new street-lamp services, in different areas.

ENLISTMENT OF GAS-WORKS EMPLOYEES.

We learn from Mr. Walter T. Dunn that a letter has been received by the Institution of Gas Engineers from the Director of Recruiting with reference to the enlistment of gas-works employees for service in His Majesty's Military Forces, stating that the instructions to recruiting officers in the letter on the subject from the War Office to the Institution still hold good—viz.:

"That on no account should skilled employees of gas-works . . . be accepted for enlistment unless they are in possession of a certificate from their employers that their services can be spared."

The letter further states that these instructions were issued to all recruiting officers, and requests that any case in which men are enlisted without their employers' consent and the recruiting officer states he has received no instructions on the subject, should be brought to notice.

GAS WORKERS AND MUNITION VOLUNTEERS.

The Vital Importance of Relief.

The following correspondence has taken place between Mr. Walter T. Dunn, writing as Secretary of the Institution of Gas Engineers, and the Munition Workers' Enrolment Department. In a letter, dated the 7th inst., which he addressed to the Minister of Munitions (the Rt. Hon. D. Lloyd George), Mr. Dunn said:

The attention of the Institution of Gas Engineers has been called by gas undertakings throughout the country to the urgent necessity of such instructions being immediately given so that men who are engaged in the service of gas undertakings shall not be accepted as munition workers. So many gas-works employees of all grades have already enlisted in His Majesty's forces that no more can possibly be spared, if the public service of providing heat, light, and power, with which the gas undertakings of the country are entrusted by Parliament, is to be maintained.

As you are aware, the extraction of toluol for the manufacture of high explosives is being carried on at the gas-works throughout the country, the plant of which must be kept going. It is also of the highest importance that manufacturers supplying the plant required for this work shall not be hampered, owing to their men leaving to become munition workers.

We would therefore respectfully ask you to give instructions for the non-acceptance of—

I. Men who are employed by gas undertakings.
II. Men who are employed by gas-plant manufacturers in the production of plant required by gas undertakings.

We shall be glad to learn that you have been able to afford the relief, which is of vital importance to the interests of the country.

To this letter, the following reply was, on the 14th inst., sent to Mr. Dunn by Mr. C. F. Ray, writing from the Munition Workers' Enrolment Department of the Ministry of Munitions of War, Whitehall Gardens, S.W.:

With reference to your letter of the 7th inst., respecting the enrolment of the employees of gas undertakings and gas-plant manufacturers as War Munition Volunteers, I am directed by the Minister of Munitions to inform you that he regrets that it is not possible to issue instructions that men employed in particular undertakings or works should not be enrolled as War Munition Volunteers, if they state that they are not engaged on Government work.

It does not, of course, necessarily follow that all the men who enrol as Munition Volunteers will be transferred from their present employment. Moreover, in every case an opportunity will be given to the employer to state, for the consideration of the Minister of Munitions, that the man is engaged upon Government or other essential work, or to submit any other reasons which, in the employer's opinion, render it desirable in the national interest that the workman should not be transferred from his present employment.

PERSONAL.

On Monday of last week, at their first meeting in the new session, the Council of the Society of Arts elected Mr. Dugald Clerk, D.Sc., F.R.S., as Chairman for the ensuing year.

Mr. W. J. Collins Garrard—the youngest son of Mr. J. S. Garrard, the Secretary of the Eastbourne Gas Company, and who is second assistant upon the engineering staff of the Ipswich Gas Company—has just been gazetted Second Lieutenant in the 12th Worcestershire Regiment.

Mr. Charles E. Ellis, who has been Managing-Director of Messrs. John Brown and Co., Limited, for the past 25 years, has resigned his directorship of this and two other companies, in order to place his services at the disposal of the Ministry of Munitions. In addition to his many other appointments, Mr. Ellis has for many years been Hon. Treasurer of the Institution of Naval Architects.

Mr. J. G. Tooms, formerly of Waterford, who recently terminated his engagement as Assistant General Manager and Engineer to the Primitiva Gas Company of Buenos Ayres, has been appointed by the Corporation of Christiania (Norway) Engineer

for the construction of their new gas-works of 5 million cubic feet per day capacity, applications for which position were recently invited in the advertisement columns of the "JOURNAL." Mr. Tooms leaves England on the 10th prox.

Mr. FRANK HIGGINSON, who has severed his connection with the Broadstairs Gas Company, after having occupied the position of Secretary and Manager for fifteen years, has been presented by the officials and workmen with a gold wristlet-watch, accompanied by an address. Since Mr. Higginson took up his position with the Company (in March, 1900) many important additions and alterations have been made to the works.

Mr. W. J. LIBERTY, the Inspector of Public Lighting for the City of London—who, at the beginning of the war joined the London Anti-Aircraft Corps, and was afterwards sent to the East Coast on special service with the Armoured Car Section, and subsequently transferred to the Southern Mobile Command at Headquarters, as Acting Chief Petty Officer—has just been transferred to the Royal Naval Air Service (Foreign Service Section) at Headquarters Naval Camp, Whitehill, Bletchingly, with rank as Chief Petty Officer.

OBITUARY.

Mr. HENRY FOURNESS, the inventor of the Fourness gas-lamp, died yesterday (Monday) week at his residence, Rumford Street, Manchester, in his seventieth year. He was formerly well known in the gas engineering profession, and secured highest awards at several important exhibitions. Like many inventors, he had his share of litigation and financial difficulties; and although he had to face bankruptcy proceedings, he ultimately paid his creditors 20s. in the pound, *plus* 4 per cent. interest, as the records of the Manchester and Leeds Courts show.

The death is announced as having taken place on Saturday, at his residence, Wallington, Surrey, of Mr. A. W. COOPER, who for thirty years was Secretary of the Malta and Mediterranean Gas Company, and for the last few years occupied a similar position with the Ottoman Gas Company. Mr. Cooper's resignation of the latter position was announced at the meeting of the Company reported in the "JOURNAL" last August; while at the meeting of the Malta and Mediterranean Gas Company reported in our pages earlier this month intimation was made that a new Secretary had been appointed.

The "American Gaslight Journal" of the 12th inst. announces the death of Mrs. A. M. Callender, on July 6, at her home in New York City. Mrs. Callender became the Senior member of the firm of Callender and Co., the Publishers of the American "Journal," upon the death of her husband in 1871; and since 1913, when the business was incorporated, she has acted as its Vice-President and Treasurer. For more than forty years Mrs. Callender had been in touch with gas matters, and was personally well known to all the older generation of gas men. She leaves one son, Mr. Elbert P. Callender, the President of the Company owning the "American Gaslight Journal."

The Unsightliness of Gasholders.

In their column of lightly worded notes—"From an Office Window"—on Tuesday last week the "Daily Chronicle" wrote: One may be sure many architects are out of work just now, when the world seems intent upon battering rather than building. Let me give them a problem to solve in the peaceful future. For an hour or two yesterday I was driving with an artist from abroad through one of the loveliest parts of Surrey. Suddenly he gave a gasp, "How hideous!" It had fairly "caught him in the eye" as he was enjoying the hills, lanes, colours, and wide sweeps of outlook. It was a gasometer. Is there anything more hideous than this erection—of invariable shape? There must be some architect of genius who could reform the gasometer—that constant blot upon the landscape. We have got beyond the state of mind of Ruskin, which led him to protest against the beautifying of such abominable things as railway stations (although he consented to use the railway to Coniston). We do not want to abolish gas. But let us implore our architects to reconstruct, or at least mask, those huge inverted saucepans which despoil the banquet of the eye. Several correspondents have called attention to the above, one of whom remarks: I think everybody agrees that gasholders are not exactly things of beauty, although I have for some few years past had an affection for them, because I know they indicate the locality of the people we have to deal with in our business. Abroad, as you know, they are sometimes "housed," in order to hide any disfigurement. The following is taken from last Sunday's "Observer:" The "Daily Chronicle" is rashly inquiring for "some architect of genuis who could reform the gasometer—that constant blot upon the landscape." It is a deplorable quest; and we realize one of the advantages of the war in the fact that it will force us to economize in the decoration of things better left undecorated. We no more want a decorative gasometer than we want a decorative pickaxe; the most artistic gasometer, like the most artistic pickaxe, is the one which does its work best, and is adapted to that end and to no other. Who does not find the average gasometer a more beautiful edifice than the average cinema "palace"?

ELECTRICITY SUPPLY MEMORANDA.

IN the "Memoranda" for July 6, a paragraph appeared, with the side-heading "Changed Opinions." It dealt with the refusal of the Board of Trade and a House of Commons Committee to insert, at the instance of the local Gas Company, the Northumberland clause in the Southampton Corporation Electricity Order, and with the changed opinions, since the Winchester clause was inserted in an Order referring to that ancient city, of Sir John Snell, the President of the Institution of Electrical Engineers, who now confesses, by the act of present opposition, to not having then considered in all its bearings the effect of the insertion of the clause. Of course, he has not considered them all now, if his revised opinions allude to any and every electricity supply undertaking, because he could not possibly, holding the new opinions, have contemplated the rights to protection of ratepayers as opposed to the supply of electricity to consumers at prices that do not prevent deficits falling upon an innocent body of people. It is more essential than ever—now that Prussian ambitions have brought British citizens and townsmen to the necessity of dipping deeper into their pockets for everything requisite to existence, and for financing the country through taxes and otherwise—that ratepayers generally should be assured of freedom from the compulsory burden of having to contribute to the cost of supplying other people's premises with electric light and power. There was never a more audacious or scandalous system invented than this one of piling on to the ratepayers losses in connection with municipal adventure of this kind. Ratepayers must be protected. Since 1904 Parliament and the Board of Trade have agreed with this; and on every occasion, save this one of Southampton, the clause has been inserted on the application of gas companies as large ratepayers. But while refused by the Board of Trade and the Commons Committee, it has now been inserted in the Southampton Order by the Lords Committee in respect not of the whole borough, but of the extended electricity supply area. The Gas Company would have preferred the whole area, but they must now perforce be content with the application to the extension. There was some curiosity on the part of their Lordships as to why the Board of Trade had made an exception in this case; and in satisfying their curiosity by summoning before them a representative of the Board, they have also gratified our own. The Board, it seems, reserve to themselves the right not to insert the clause if they think there is no necessity for it. Seeing that they do not think it necessary in such a substantial and long-established concern as that of Southampton, and that this was the first time the reservation had been exercised on the raising of the matter, it shows that they have had their doubts in a good many other instances. Even in the case of substantial concerns like that of Southampton, the time may come when there will be mismanagement—in fact, Sir John Snell has already told the Corporation that they ought to alter their flat-rate of ½d. per unit for cooking and heating to the rateable value system, and that they should have put a coal clause in a low-priced long-running power contract into which they have entered. Should there be maladministration at any time, combined with unpropitious circumstances, the presence of the Northumberland clause in the Order would have been very useful; and so long as the concern was properly conducted, the clause would have been quite harmless and inoperative. However, it is some gain to have had the reversal of the decision of the Board of Trade and the House of Commons Committee in respect of the extended area.

A Quick Reverse for Southampton.

Burden-Bearing and Justice.

The "Electrician" has also been discussing the question of the application of the Northumberland clause to electricity supply undertakings. It says that the general view must be that this "should be" quite unnecessary. That, of course, is the general view. But unfortunately what "should be" quite unnecessary has been found to be very necessary indeed in many cases through municipal mismanagement, cut prices, heavy deficiencies, and considerable burdens on the ratepayers. It goes on to remark that "if profit does not arise in the ordinary course of things, it is not likely to be provided by any such clause." It cannot be denied by our contemporary that the management of not a few local authority electric undertakings has not been according to the "ordinary course of things" as the "ordinary course of things" is construed by those conducting private enterprise without the ratepayers to fall back upon to make good the results of any financial or managerial delinquencies. Our contemporary talks about "burdening" an electricity undertaking with the Northumberland clause; but it has nothing at all to say as to the more serious aspect of the matter, the burdening of ratepayers with deficiencies, sometimes for years—in certain cases the trouble appears to be permanently established. "Power agreements," it is pointed out, "are frequently made for five, seven, or even ten years;" and the question is asked, "How can undertakers burdened with the Northumberland clause entertain agreements of this sort?" The answer is, in the same way that private enterprises enter into like agreements, and make their business yield a good return on the capital, without the power to have recourse to the rates. If the "Electrical Review" were conducted by the London County

Council, and the Council cut their prices for advertisements, and did not make the "municipal enterprise" pay, having as a result to draw upon the ratepayers to make up the losses, the "Electrician," whose advertisement columns might suffer in consequence of the cutting acts of the Council (besides having to pay its share as a ratepayer for the support of the "Review"), would resent the whole proceeding and imposition. Gas undertakings are in the illustration represented by the "Electrician." They are not only business competitors of municipally controlled electricity undertakings, but they are very large ratepayers, and have been for years before municipal electricity supply came on to the scene. *Fiat justitia, ruat cœlum.*

Serious Fire Risks.

We should have thought that the danger of placing incombustible material in proximity to electric-lamps had had sufficient demonstration among shopkeepers to have prevented the imbecile practice of putting paper shades round, and in contact with, such lamps. Some people will never give up dangerous practices till they have to personally pay the penalty of their indifference. However, a warning by the London Fire Brigade may have some useful effect in certain quarters, if not generally; and we are pleased to assist in giving publicity to their views in order to produce "result in the discontinuance of the dangerous practice of using inflammable materials for obscuring lights in shop windows." The report of the Fire Brigade states that they have recently been called to an outbreak of fire caused by the crinkled paper round electric-lamp globes in a shop window catching fire, as a result of the heat generated by the lamps, and setting fire to the goods displayed in the window. The paper, it seems, had been placed round the globes, so as to obscure the lights in accordance with the police regulations now in force; and (says the report) there is reason to believe that crinkled paper, or other highly combustible material is being used in many cases for this purpose, and that "serious fire risks are thus being caused." Coloured globes and incombustible shades are advised as preferable. Speaking of fire risks, we saw the other day (after the event) a nasty case of an electric fused wire in the basement of one of the Aërated Bread Company's depôts. The wood covering had been removed, and the ugly condition of the wires at the place where the fusing occurred was fully exposed. It was a good object-lesson for the customers.

Supply to Picture Palaces.

An interesting case has been heard in the Alloa Sheriff's Court, in which the Alloa Theatre Company, Limited, was arraigned by the Burgh Authorities for the payment of an account for the supply of electricity during the month of March. The Theatre Company use a motor generator; and they contended that the energy supplied to the motor should be charged up to them at power rates. The Burgh Authorities submitted that the energy was supplied for lighting purposes, and that the generator set was merely the equivalent of a transformer. We are not very much concerned whether the electricity supplied to motor-generator sets is regarded as a power or a lighting supply —save that, if it is charged up at the lighting rates, the better the opportunity for the gas industry to come in with its gas-engines. However, it follows that, if the electricity supplied to a motor generator set is a lighting supply (which was *not* the view of the Sheriff), then, as a gas-engine could be connected up equally well with the dynamo, the electricians have, in order to be logical, to contend that the gas supplied to the engine connected to the dynamo is also for lighting purposes, though converted to electricity, and so should be charged for at lighting rates. They are queer sticks these electricians; and they enter into niceties which in the gas industry are put aside. We are not at all particular, and do not make any discrimination in fixing the charge, as to the use to which a gas-engine is going to be put. Gas supplied to a gas-engine is charged at power rates—the only difference made being in respect of the volume of the business done. This seems to be the practical and common-sense course. The Sheriff, as pointed out, could not put his mind into such a disordered state that he could see that the energy supplied to the motor, which was there expended in work, should be charged at lighting rates any more than energy supplied in any other form—as gas, or (if possible) steam. The same thing applies to electric-motors used for compressing gas. The electricians say that this is electricity supplied for lighting purposes; while the electricity is entirely expended in doing the work of compressing the gas [see "JOURNAL," July 8, 1913, p. 116]. They are comical fellows these. Although the Alloa Sheriff held that the motor must be supplied at power rates, the Theatre Company might do well to consider the economies of the gas-engine. The use of the motor genetrator set, if energy is drawn from the town cables, is necessitated by the fact that the standard pressure required in the operating boxes of picture theatres is only some 70 volts; but then the output of the dynamo is only about 68 per cent. of the energy taken by the motor—there being a loss of some 30 per cent. The gas-engine can give an economical electricity supply, and make every picture palace self-contained and independent of the vagaries of the town electricity service. The Alloa Picture Palace people should study Mr. H. C. Widlake's article, on "What Gas can do for Cinema Theatres," which appeared in our issue for Aug. 4 last year (p. 283). If the advice there tendered be taken, there will be no more trouble with the Alloa Electricity Department.

New Heating Elements.

A great deal of difficulty is experienced with heating elements of fires and ovens. Now that high temperature incandescent elements are being used in order to give users a nearer approach to what they require—that is to say, heat—trouble from oxidation and other things is experienced. The electrical people find drawbacks in connection with heating at every new step they take; and this circumstance is not very encouraging. Now the General Electric Company of America have put forward a fresh proposition for constructing heating elements; but in drawing attention to it, the "Electrician" does not appear to be highly enamoured of it. The wire serves as a core, which is sheathed by steel, copper, or other metal or alloy; and the operating temperature of the core may be from 800° to 1000° C. Hot-plates are made by pouring molten cast-iron directly around a coil of the sheathed wire. This, it is stated, gives a strong rugged hot-plate, which will not warp or crack. The criticisms of the "Electrician" are that it is clear the steel sheath must be at a temperature very much lower than that of the wire, and that, if unprotected steel were at a radiant temperature, oxidation would set in. For this reason, the surface must be protected by a coating of aluminium steel alloy, if the temperature is to be above 400° C. Again the new style of wire must be more bulky. Our contemporary is of opinion that what is required still more is an alloy which will not oxidize when running at a bright red heat. From this it is seen that the electrical industry is not yet out of the wood in the matter of the provision of heating elements which are, mechanically and in heating efficiency, the superiors of their predecessors. It seems to us that to realize greater durability in electric heating elements something has to be given up in the way of efficiency, which means increased cost.

Osram Lamp Control.

When the war started, everything German was as a red rag to an incensed British public. The foul and inhuman crimes of Germany since then have added to the abhorrence which was first felt over the terrible destruction in Belgium. The German nation will have all their work cut out to live-down the evil and barbarous reputation that they have been building-up with cold-blooded indifference. The Directors of the General Electric Company have seen this. They had heaped upon them heavy anxiety at the outbreak of hostilities, owing to the fact that a very large proportion of the capital in the Osram Lamp Works, Limited, at Hammersmith, was German held, and a large proportion of the profits made from the British use of the Osram lamps was shipped, prior to the war, to the country of our arch enemies. At the annual meeting of the General Electric Company, the Chairman (Mr. H. Hirst) was able to announce, with gratification, that a way had been found—with the knowledge of the Treasury and the Public Trustee—which would give the future control of these works, he trusted for ever, into British hands. It would have been better if Mr. Hirst had expanded a little on this. Does he mean that the German capital will now be completely eliminated from the business, or only the control? Some doubt as to the completeness of the elimination of German control seems to permeate the words "he trusted for ever." What about the German monopoly of the use of the Travancore monazite sands? Can Mr. Hirst say whether the sands drawn from India will, after the war, be wholly assigned to Berlin, or whether they will henceforth be boycotted, and the sands brought here to provide thorium for making mantles at home?

Where Gas Cannot Beat Electricity in Cost.

It is hopeless for gas to try to beat electricity for street lighting in Consett. The Cleveland and Durham Electric Supply Company have been engaged with the Consett District Council in negotiations for electricity supply in the urban area; and one condition is that the electric lighting of the streets is not to cost the ratepayers a penny piece the next fifteen years. The cost is stated to have hitherto been about £800 a year.

The Late Mr. Allen.

At a meeting last Wednesday of the Council of the University of Leeds—the Pro-Chancellor (Mr. A. G. Lupton) presiding—the news of the death of Mr. Allen, who had served as a member of the Advisory Committee on the Coal Gas and Fuel Industries (Livesey Professorship) Department, in the capacity of a representative of the Institution of Gas Engineers, was received with regret. The Council recorded their grateful recollection of the strong interest which Mr. Allen took in the welfare of the Coal Gas and Fuel Industries Department (at the meetings of which he was a regular attendant), and of the sound judgment and expert advice which he placed at the service of the University. We are asked by Mrs. Allen and the family to convey to the gas profession through the medium of the "JOURNAL" their sincere thanks for the kindness and sympathy shown to them in their bereavement.

The French Ministry of War has reserved for the manufacture of explosives the whole of the output of gas tar in France. The use of tar as fuel, or its sale or use for any other purpose than distillation, has been prohibited, except under licence from the War Office.

COKING AND BYE-PRODUCTS.

By "Event and Comment."

The Estimation of Benzol.

With further reference to the comments which have been made in these notes recently concerning the various methods adopted in determining the quantity of benzol in coke-oven gas, the following description of a test recommended by J. J. Morgan in his "Aids to the Analysis of Ores, Metals, Fuels, &c.," is of interest:

> Pass a measured volume, from 10 to 20 cubic feet, of the gas through at least three bottles containing 150 to 200 cc. of nitro-benzol or creosote oil, at the rate of 1 cubic foot per hour. Transfer the contents of the bottles to a distillation flask, the neck of which is closed with a bung carrying a three-bulb Bel-Henniger fractional distillation-tube. Close the open end of the distillation-tube with a bung, through which pass a thermometer so that the bulb is exactly in line with the side tube, and connect the latter with a water-cooled (Liebig) condenser. Distil. Heat cautiously at first, collecting the distillate in a 100 cc. glass cylinder graduated in tenths. When the temperature has reached 120° C., allow the contents of the flask to cool to 100°, and again distil until 120° C. is reached. Repeat this some four to five times to insure the benzol being driven off. Allow the condenser to drain, and, when cool, note the volume of benzol distilled. Should water come over with the benzol, remove it by means of a fine-pointed pipette, return the benzol to the flask, and redistil. The gallons of benzol per ton of coal equal $\frac{V \times Q}{v \times 4543}$ where V = cubic feet of gas per ton of coal, Q = number of ccs. of benzol obtained, v = number of cubic feet of gas used in the test, 4543 = number of ccs. in a gallon. The benzol may contain small quantities of toluene and xylenes.

The method suggested is undoubtedly a good one, but it really needs some little qualification, especially if it be used by a comparatively inexperienced hand. In the first place, the temperature of the gas used should be about that of the atmosphere, and the creosote oil used for absorption purposes should be previously distilled and all fractions coming off below 200° C. eliminated. With regard to the temperature of distillation of the benzolized oil obtained in the test, a difference of opinion exists as to what this should be. If the object of the test is to determine the amount of benzol—apart from toluol, xylol, &c.—in the gas, then it fails, for (as Mr. Morgan points out) "the benzol may contain small quantities of toluene and xylenes." At the temperature taken a good proportion of the toluene, and also some of the xylenes and solvent naphtha, will distil over with the benzol. If, however, the object of the test is to determine the total amount of crude benzol—*i.e.*, including the toluol, xylol, &c.—recoverable, then it hardly seems right to take the temperature only to 120° C. The sample of benzol recovered in the test described will all distil below 120° C., whereas in the case of ordinary crude benzol, only about 65 per cent. of it distils at this temperature. In modern benzol plants, the rich creosote oil is usually heated to about 135° C. The writer would suggest, therefore, that in the test the temperature of distillation of the oil be taken to 135° C., and the product then obtained corresponds to the crude benzol of ordinary bye-product coking practice. If further information as to the composition of this product is required a fairly large sample must be collected and submitted to fractional distillation in the usual way.

Mixing of Coals for Bye-Product Coking.

The tendency in bye-product coking nowadays is to follow the American practice—*i.e.*, speeding-up of the work generally. In making comparisons, it must, of course, be recognized that conditions in America are somewhat different from those obtaining here; but, nevertheless, the general features are very similar. The mixing of different classes of coal is not much practised in this country on definite lines. More or less haphazard mixing is certainly carried out at a number of places. Collieries working various seams at different pits frequently send all the small coal to a central battery of ovens, but systematic mixing is not carried out. In America, on the other hand, scientific mixing is carried on. The properties of the various classes of coal are studied under working conditions, and many experiments carried out in order to determine what are the best proportions in which to mix the various coals; and such proportions, when once determined, are rigidly adhered to. In this way it is possible to produce the best quality of coke, control the ash, sulphur, and phosphorus content of the coke, and regulate the quantity of gas and bye-products obtainable. It is known quite well that certain classes of coal, when used alone, do not produce good coke, though the amount of tar, ammonia, benzol, &c., obtainable are exceedingly favourable. By judicious selection of coals it is possible to include such as these in the coking class by mixing them with first-class coking coals. At many of the more modern American bye-product coking plants, elaborate mixing stations have been installed. In coking, as in other things, the American policy is "hustle." Everything that can be done to increase the capacity of a plant is regarded with favour. Whereas in this country there are few ovens capable of holding even as much as 10 tons of coal per charge, in America 13-ton ovens are quite common, and 15-ton charges are not unknown. In the matter of carbonizing period we are a long way behind. It is doubtful if there is a plant in this country burning-off large ovens in less than 24 hours. The 13-ton ovens in America are burnt off in 14 to 18 hours. This is, of course, partly due to the coal—which is often quite dry—but also to the fact that higher carbonizing temperatures are more usual. Then, again, silica bricks are more frequently used for the construction of the ovens; and this perhaps is one of the most important features. Undoubtedly, some useful hints can be gained from modern American practice.

MR. N. H. HUMPHRYS AND GAS MANAGEMENT AT SALISBURY.

On the 13th inst., we reported that Mr. Humphrys had decided to retire from the position at Salisbury with which his name is so intimately associated, and which he has held for over twenty years with credit to himself, and to the advantage of both shareholders in the Company and consumers of gas in the district. We are now able to add a few details that will be interesting to the numerous members of the profession with whom, during a connection with the gas industry that has extended close up to fifty years, he has established friendship or acquaintance.

He entered the profession in 1866, on leaving school, as pupil and assistant to the late Mr. Samuel Pontifex, who was at that period interested in the development of small gas undertakings; and in 1873 was engaged by Messrs. Edward Cockey and Sons, of Frome, with the object of assisting in the management of various small gas-works that they held on lease. Later, when the leases had expired, he was Manager of gas-works at Westbury and at Melksham, and in 1883 went to Salisbury as Assistant Manager under the late Mr. Thomas Hardick. On the death of that gentleman in 1895, at the advanced age of 90, Mr. Humphrys was appointed to the position he is now vacating.

None of those who are personally acquainted with Mr. Humphrys, and also with the position of affairs that has been general at Salisbury since the outbreak of war, will be greatly surprised to hear that he has decided in favour of a smoother and less strenuous occupation, free from the numerous anxieties and distractions that have fallen to his lot during the last twelve months. As his friends have frequently observed, no one can expect immunity from worry of some sort in these times, but he has had more than the common share. We recall rumours of empty coal stores, of the stock of coal running down to within 36 hours' requirements, and the situation being saved by prompt action on the part of the Mayor; of men dropping away by the half-dozen, without even an hour's notice, for enlistment, or for Government work at the numerous camps pitched on Salisbury Plain—particularly favouring Saturdays and Sundays for the purpose, just the time it is most difficult immediately to fill up the gaps and maintain the regular continuity of operations—until not more than 40 per cent. of the original staff remain; of difficulty in filling the vacant places, especially where hot, heavy, and dusty work was concerned, more by reason of the general demoralization brought about by the excessive rates of pay and easy conditions of work offered by the Government contractors on the plain, than by actual shortage of men on account of enlistment; of prolonged delay in the delivery of coal, and of all other materials or goods, both inwards and outwards, that are carried by rail, and frequent declarations that Salisbury was a "closed" station, sometimes for weeks at a time; of tar having to be sent 25 miles by road motor; and such like matters. It is therefore evident that Mr. Humphrys' physical strength (never over-robust, and now somewhat weakened by advancing age) has been strained close to the breaking point. Large quantities of coal for South Coast towns, formerly supplied exclusively by water, are now carried by rail through Salisbury—thus aggravating the congestion of traffic due to military requirements. Other places have suffered from some of these troubles; but nowhere have they been more acute than at Salisbury. The geographical position as a junction between Southampton, Portsmouth, and the whole of the Western part of the country, the importance as a military centre, due to the headquarters of the Southern Command being in the city, and the fact that the whole neighbourhood for twenty miles round is dotted with encampments, all tend towards a very precarious position so far as supplies of materials and labour are concerned.

Mr. Humphrys has no reason to be ashamed of his record at Salisbury. He has always maintained a gas supply well over legal requirements, in respect to quality and purity, even under the trying conditions above instanced. He has consistently sent out a gas equal to 14½ to 15 candles tested by the No. 1 "London" argand burner as prescribed by the Company's Act, having a calorific value of 600 B.Th.U. per cubic foot within a margin of 20 units either way, and averaging less than 15 grains of sulphur in all forms per 100 cubic feet. The calorimeter was systematically used at Salisbury years before it was generally recognized in gas-works. Notwithstanding advanced cost of coal and labour, the selling price has been steadily reduced from an all-round rate of 3s. 6d. per 1000 cubic feet to 2s. 11d., with a liberal scale of discounts to large users. Of course, the special circumstances of the last few months have necessitated a break in this policy; and the price was raised to 3s. 2d. on the 1st of April last. A further advance may be found necessary when the

accounts for the year that ended June 30 are completed. The income from all sources for the year ended June 30, 1885, was £11,280; but the corresponding item for the year just completed will be nearly £30,000. The capital outlay at the earlier date was £34,381, approximately three times the annual income; but to-day it is just over £60,000, or about twice as much. With increased tonnage of coal, and bulk of gas to be handled, to the extent of quite threefold, the increase of capital is only in the proportion of 75 per cent. The amount received for rent of cookers, &c., during the year 1884-5 was £26; at present the annual rental for appliances on hire is over £1200, exclusive of sales of fittings and charges for maintenance of incandescent gas lights, which include the care of about 6000 burners. Maximum dividends have been the rule for over forty years, and the reserve fund and balance of profits have been largely increased.

The whole of the extensions on the works and in the district necessitated by this increase of business have been carried out to the design and under the superintendence of Mr. Humphrys, who is a believer in maintaining a sufficient staff to deal with ordinary repairs and extensions. The principal items at the works have been the entire reconstruction of the retort-benches on the generator system, a new retort-house with settings arranged back to back on either side of the centre line, in through arches to admit of through retorts being introduced, and a roof span of 72 feet, leaving ample room for the introduction of drawing and charging machinery without structural alteration. The space has been useful as affording means of tipping the coal directly in front of the retorts, but is now being utilized for the erection of a set of Aldridge and Ranken electrically driven retort-house machinery. The increased cost and uncertainty as to the supply of coal in 1912 led to an examination of the claims put forward by makers of carburetted water-gas plant; and a 150,000 cubic feet set was put down, with provision for duplication. The second set has just been completed—thus bringing the total producing plant up to a million cubic feet in 24 hours, or 50 per cent. in excess of the present maximum capacity. But neither this nor the new retort-house machinery is included in the £60,000 outlay just mentioned. A Kirkham, Hulett, and Chandler 500,000 cubic feet centrifugal "Standard" washer, with gas-engine, has been erected; the purifiers have been rearranged and enlarged, with the result that the purification charges are less than ¼d. per 1000 cubic feet of gas; and a 30,000 cubic feet per hour station meter, two new distribution governors, safety bye-pass, a Waller turbine-driven booster, and a 400,000 cubic feet double-lift gasholder in a cast-iron tank have all been added to the plant. The sulphate of ammonia apparatus has twice been entirely reconstructed. One of Mr. Humphrys' hobbies has been the construction of a reinforced concrete store for meters, cookers, pipe, fittings, &c., 60 feet by 30 feet by 20 feet high at the gables; the whole of the staple material used consisting of old retort-house settings. The act of crushing to a suitable size supplied a sufficient quantity of dust and small to furnish an excellent substitute for sand.

In the district there have been numerous enlargements and extensions of mains, which include several miles of steel and wrought-iron pipe, ranging from 3-inch to 8-inch diameter. The first trial of this material was put down some fifteen years ago, and the pipe is to-day as sound as when laid—the covering being an efficient protection. Salisbury was among the earliest to adopt the incandescent burner for public lighting, and Mr. Humphrys carried out all the necessary arrangements. Being convinced of the necessity of using cylindrical glass protectors as now generally adopted, but which were at that time not listed by makers of burners, and were not considered requisite, Mr. Humphrys obtained a supply specially made to his own design. Self-intensifying and inverted burners and other improvements have been introduced from time to time, but a large portion of the system thus inaugurated is still in use. The principal streets of the city are generally admitted to be effectively lighted, and suggestions for high-pressure lighting have not been seriously considered, on the ground that the present system answers all reasonable requirements. The slot-meter system was introduced as soon as a satisfactory and reliable make of meter was available, and this department now includes 3000 consumers, of whom over 90 per cent. use cookers. The whole of the installation work was carried out by the permanent staff, and the greater part of the customers use 5-light shilling meters. There are a few dozen penny and a small number of 10-light and 20-light half-crown meters. The penny meter is not in favour—the customers finding it more convenient to put in a shilling on Saturday (sufficient to run the week).

As regards the principal members of the staff, the changes since 1883 have not been numerous; the majority being those due to the ordinary course of Nature. Some of them can boast a longer record of service than their late chief; and in respect to these, the unfailing devotion to duty and reliability on emergency afforded by the works foreman, Mr. J. C. Watts, is worthy of particular mention.

Mr. Humphrys has taken some part in the general progress of the gas industry, though of late years he has not been so much in evidence—either in our columns or at meetings of gas engineers. But during a considerable period, he was a frequent contributor to the one, and a regular attendant at the other. He read several papers, and occasionally figured in discussions. He was elected the Honorary Secretary and Treasurer of the South-West of England District Association of Gas Managers in 1884, and held the office till the Association was merged into the Southern District in 1896, on which occasion he was the recipient of a handsome silver tea and coffee service. He passed the presidential chair of the South-West Association, and was subsequently twice elected President of the Southern District Association. He also has served on the Council of the Institution of Gas Engineers. For over thirty years he has contributed a monthly English letter, reviewing the topics of the day, to the columns of the "American Gas Light Journal." He has from the first upheld the importance of technical education in connection with the industry, and also of conducting the sales department on a sound and energetic commercial footing; and it would be difficult to find any advancement that he has not to a greater or less extent foreshadowed, or move towards progress in any direction that has not met with his support and encouragement. His investigation in connection with the Settle-Padfield vertical retort at Exeter, which directed attention to the improved carbonizing results thus rendered practicable, will be especially remembered. He has not taken a large number of pupils, but those who have passed under his care have done well, and some are occupying important positions in the profession. Always opposed to anything in the way of rule-of-thumb, he has believed in thorough investigation of every detail by the light of either experiment or calculation. He is an expert chemist, draughtsman, and mathematician, and a knowledge of shorthand has been of the greatest assistance in connection with literary researches. His duties at Salisbury have left little time for outside work; but many gas companies in the district have for years been in the habit of taking his advice before carrying out important alterations or extensions.

Mr. Humphrys has been fortunate in his home and domestic life, and he has asked us to say, in connection with any reference to his career, that it is quite impossible to indicate the extent of his indebtedness to the lady who has so faithfully supported and cared for his welfare during his residence at Salisbury, and how much her constant care for his health is concerned in any success attaching to the work he has been able to do. Of late much has been said and written about the emancipation of woman, and the work that she is capable of doing in regard to public affairs. But there has been little recognition of the important work that has been, and is being, done by thousands of wives and mothers who do not seek publicity, but are more than satisfied to devote their whole attention to the care of their homes and their children, leaving the husband free to apply his full energies to his business, social, or public duties and obligations.

THE NEW GAS-WORKS AT BUDAPEST.

By M. Isidor Bernauer, the Manager.

[Abstract-Translation of a Description in the "Journal für Gasbeleuchtung" for May 8, 15, 22, and 29.]

(*Continued from p.* 126.)

Compressor Plant.

The compressor installation consists of two turbo-compressors, each of 530,000 cubic feet per hour capacity—the maximum difference of pressure being 102 inches of water. Each compressor is coupled direct with a three-phase alternating current motor of 200-H.P. The maximum number of revolutions is 2930 per minute (190 volts, 50 periods). The quantity dealt with can be lowered to 177,000 cubic feet per hour by reducing the revolutions to about 1550 per minute, and the difference of pressure to 25½ inches of water. The horse power then required is about sixteen. These figures indicate the limits within which it is possible to regulate the work of the plant. Normal working may be put at a capacity of 353,000 cubic feet per hour, with 2200 revolutions per minute, an expenditure of about 73 H.P., and a difference of pressure of about 55 inches of water. Each blower consists of a cast-iron cylinder with four rotating steel wheels and a steel shaft. It has a hydraulic stuffing-box intended to prevent the escape of gas into the room. The motor and blower are on a common base-plate, and are connected by an elastic coupling. There are independent switches and starting apparatus for each set of plant. These are in a separate room; but the starting apparatus can also be operated from the engine-room. The building has been designed so that a set of 1,060,000 cubic feet per hour capacity can later be installed in it.

A travelling crane, operated by hand, has also been fitted up for a load of 8 tons, in view of the introduction later of this large set of apparatus. The crane has a span of 41 ft. 8 in., and a lift of 14 ft. 9 in.; and its weight is about 9 tons. The framing is a strong one; the two chief members being rolled double-T joists, to the top flanges of which flat-iron rails are attached. The transverse members are of U section iron attached by straps to the principal members. The running wheels are loose on their axles, and to two of them toothed wheels are attached, by which, through chain gearing, the crane can be moved to and fro from the floor by a hand chain and chain wheel. The traveller of the crane has besides a very strong framing and double-flanged wheels which run on the rails on the chief girders. It is moved to and fro by a hand chain reaching to the floor of the room. The load is supported from the loop of a Gall's chain, one end of which is fixed to the traveller, while the other runs on a chain wheel attached to a worm wheel. To one end of the shaft of the steel worm is keyed a chain wheel, on which a hand chain

reaching to the floor runs for the purpose of raising the load. The chain carrying the load has been tested to double, and the traveller to one-and-a-half times, the possible load. Very special attention has been given to providing for easy access to all parts requiring lubrication. The crane travels on flat-iron rails riveted to rolled iron girders supported by masonry columns 20 feet apart. The track is about 65 feet in length.

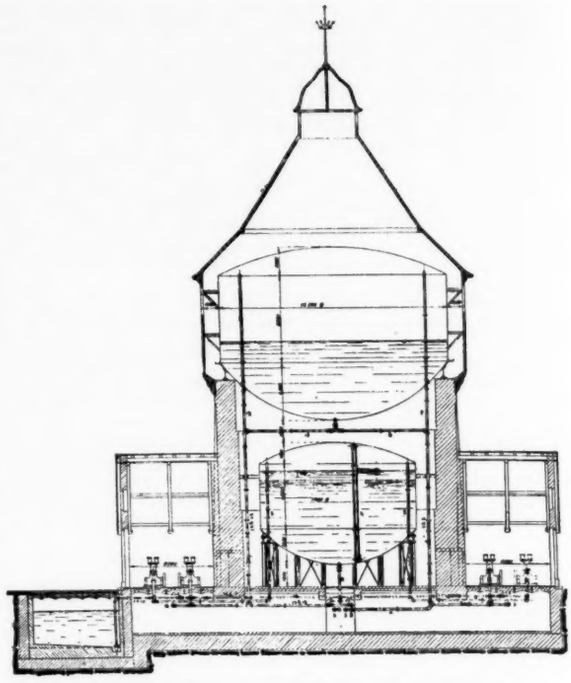
The connections inside the house vary from 16 to 40 inches in diameter, and, with the exception of bends, are of welded steel of nearly ¼ inch thickness. One suction main, 40 inches in diameter, enters the house; but there are two pressure mains, each 32 inches in diameter, connected so that either one can be used as a stand-by for the other. The gasholders on the works can also be put in direct communication with the high-pressure mains. One of these is reduced to 24 inches as it leaves the house, the other has not yet been carried outside the walls. The outlet pressure on the high-pressure main is recorded on an indicator having a range of 0 to 157 inches of water. There is another recording pressure indicator, of smaller range, fitted upon the suction-main.

In each pressure-main leading from the turbo-compressors to the principal high-pressure main there is a non-return valve, so as to prevent one compressor, when idle, being driven backwards through the working of the other compressor. At present the second compressor is merely a stand-by. There is a 12-inch branch main from the 24-inch high-pressure main, leading to the gasholder station at the former Buda Gas-Works. There are here two gasholders, of 635,000 and 177,000 cubic feet capacity respectively. The 12-inch high-pressure main leading to them is rather over 4½ miles in length. The 24-inch high-pressure main crosses the Danube and the Ujpest branch of the Danube on the railway bridge, and goes on to the gasholder station in the Lipótváros (V) district on the Pest side. At this station there is a gasholder of 2,120,000 cubic feet capacity. Where the main crosses the street known as the Váezi Út, a branch is taken off to connect with the 32-inch main which crosses the Hungaria Körút for the supply of the gasholder of 5,300,000 cubic feet capacity which has been erected in the Köbányaváros (X) district.

A 24-inch main leads from the Buda holder station, and a 40-inch main from the Lipótváros holder station, to the town. A 48-inch main leads from the Köbányaváros gasholder to the site of the dismantled works in the Józsefváros district, where it is connected with the old distributing system. The mains, where laid underground, are ordinary socket pipes. On the bridges they are wrought-iron pipes, nearly ½ inch in thickness, welded by water gas and supported on brackets. Expansion boxes are provided on each column of the bridge, and the mains are covered with an insulating coating to protect them from the cold.

Tanks, Power, Water Supply, and Drainage.

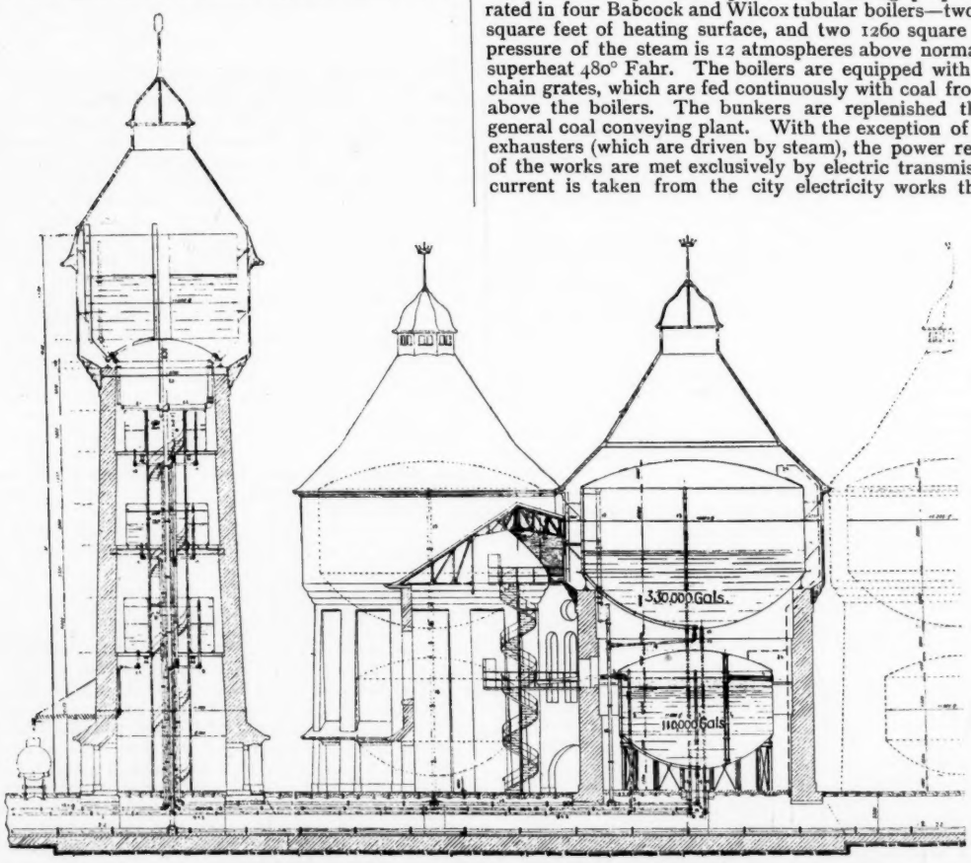
In addition to the water-tower, in which there is a reservoir of



Tar and Liquor Tank Tower at the Budapest Gas-Works.

165,000 gallons capacity, there is a group of three shorter towers with tanks for tar and liquor. Each of these towers, which are shown in the diagrams, contains one tank of 330,000 gallons capacity, with hemispherical bottom, and below it another tank of 110,000 gallons capacity. The tanks are used as separating and storage tanks for tar and liquor—one being reserved for the storage of the oil used as fuel for a Diesel engine. The necessary pumps are in an attached building. The tar and liquor deposited in the hydraulic mains and condensers are pumped into these tanks. Also there are below the water reservoir in the water-tower three elevated annular tanks into which the tar and strong liquor are pumped, and from which tar is run into tank-waggons and the liquor to the sulphate plant.

The steam required for power and heating purposes is generated in four Babcock and Wilcox tubular boilers—two with 3143 square feet of heating surface, and two 1260 square feet. The pressure of the steam is 12 atmospheres above normal, and the superheat 480° Fahr. The boilers are equipped with automatic chain grates, which are fed continuously with coal from bunkers above the boilers. The bunkers are replenished through the general coal conveying plant. With the exception of the turbo-exhausters (which are driven by steam), the power requirements of the works are met exclusively by electric transmission. The current is taken from the city electricity works through two



RESERVOIR TOWERS AT THE BUDAPEST GAS-WORKS.

conductors at 10,000 volts, and is transformed on the gas-works to 210 volts. As a standby there is installed an 800 H.P. Diesel engine driving a Ganz electric generator.

A supply of drinking water is taken from the Corporation water-works; but a special works' supply has been provided under a scheme prepared by M. Kajlinger. The works for this supply is at the north end of the site, directly below the railway bridge and on the bank of the river. There is a 16-inch suction pipe through which water is drawn direct from the Danube by two electrically driven rotary pumps and delivered into a settling tank behind the pumping-house. Another two pumps force the clarified water through an 18-inch main to the works' distributing system or into the reservoir in the water-tower. Each pump has a capacity of 860 gallons per minute.

There are two systems of drainage. One is restricted to rain and condenser water, which is taken into a main sewer running alongside the Danube, into which it has two free outlets. The other system, for fouled water, has two ejector stations, where two automatic Shone ejectors drive the water into a pressure main nearly 2 miles long which discharges it into the branch of the Danube.

The buildings are all heated by steam, which is taken from the central boiler installation. There are two Babcock and Wilcox boilers, each with 592 square feet of heating surface, in a special building, for providing steam for heating the gasholders.

The lighting of the works is chiefly by gas; but to a small extent electric lamps are used. For outside lighting there are 102 triple-burner low-pressure high-power gas-lamps, each of 900-candle power, and 114 ordinary lanterns with Welsbach burners. The gas-mains on the works have a total length of about 9½ miles.

Experimental Works, Shops, Bath-Rooms, and Dwelling Houses.

A fully equipped experimental gas-works has been provided for the purpose of checking the working of the works' plant, and controlling the quality of the coal received. There is an experimental setting of two retorts, but the subsidiary apparatus has a capacity of 123,600 cubic feet per diem; so that the gas from one of the works' carbonizing ovens can be passed through it. A well-equipped chemical laboratory is attached to the experimental works, having provision for the examination of all gas-works materials and products.

Engineers' and fitters' workshops have been provided in order to render the works independent of outside aid for all repairs to plant. They are equipped with the most modern machine tools; and there is a foundry attached. Adjoining the engineers' shop is a store; and behind the electric power station there is a large building, in reinforced concrete, for the storage of structural materials, joinery, &c. A carpenters' shop is close to this store, and in the same building are stables, garage, and fire station.

A telephone exchange, with lines to a hundred call boxes in different parts of the works, and in connection with the City telephone system, is established near the main entrance.

There is spacious washing and bathing accommodation for the workmen in a special building, having also a large dining hall, with kitchen and offices. At different parts of the works are smaller lavatories and bath and rest rooms.

At the south end of the site, between the railway station and the branch of the Danube, houses have been erected for the works' officials. Each house has its own garden—the gardens as a whole occupying 9 acres. On land separated from the works by the railway embankment, a colony of a hundred workmen's dwellings with from one to three living rooms, has been erected at a cost of £62,500. Each dwelling has its own vegetable garden. The larger ones have bath-rooms, and baths in a special building are provided for the occupiers of the smaller dwellings. A children's playground is provided.

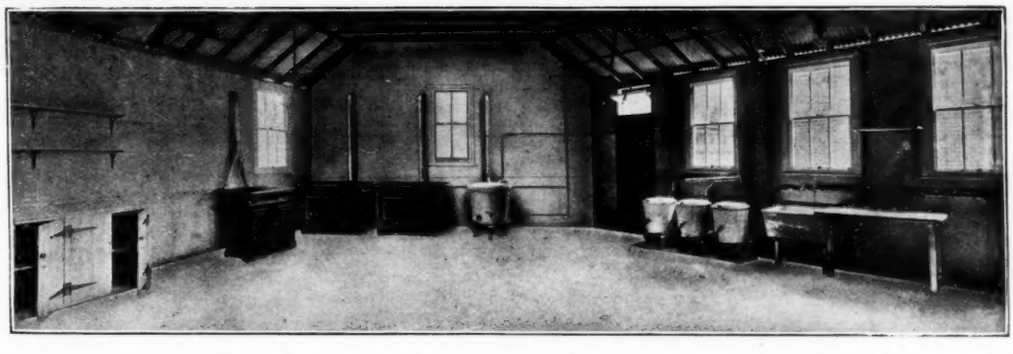
Conclusion.

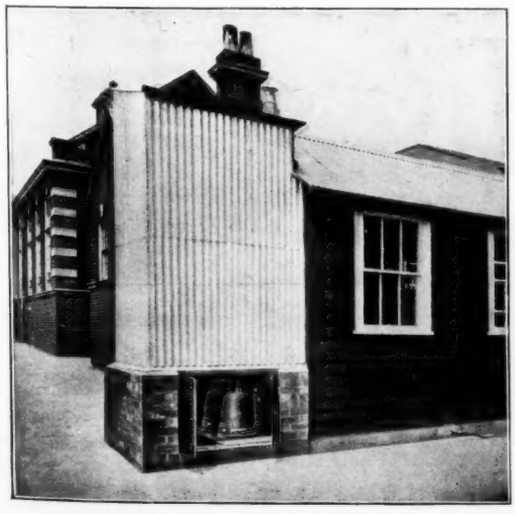
The actual cost of construction of the Óbuda Gas-Works was estimated at £1,042,000, of which £83,000 was for the dykes and the raising of the level of the ground. Actually the expenditure was so considerably below the estimate that the cost of the workmen's dwellings was covered by the saving effected. The construction was finished by the appointed time; and the new works started operations on Oct. 16, 1913. The Ujpest Gas-Works ceased working on Nov. 1, and the Buda works on Dec. 20, 1913. Finally the Józsefváros (the oldest) works were put out of action on March 31, 1914. After one-and-a-half year's working of the new Óbuda works, it can be stated that they have fulfilled all that was expected of them in respect of productive capacity, quality of gas produced, and, more especially, economy of working.

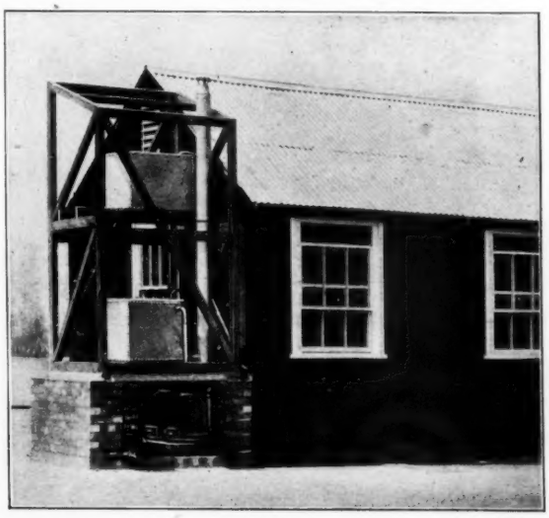
GAS IN TEMPORARY HOSPITALS.

The accompanying photographs of gas cooking and water-heating apparatus in connection with temporary hospitals recently erected at King's Heath and Selly Oak, near Birmingham, have been forwarded by Messrs. John Wright and Co. At the places mentioned, the schools have been taken over by the War Office and converted into hospital wards; while the temporary buildings illustrated have been erected as kitchens.

At one end of the interior it will be noticed that two double "Bordo" ovens, one "Aston" cooking range, and four "Gyp" boilers have been installed. There are throughout the building three sinks, one of which is shown; and to supply hot water to them, a battery of two No. 3040 "B.T.U." circulating boilers has been fixed. These are seen in the two exterior views—one showing the end of the temporary building at Selly Oak Schools, and the other the exterior of the building at King's Heath Schools. The latter photograph was taken before the hot-water arrangements were covered in.







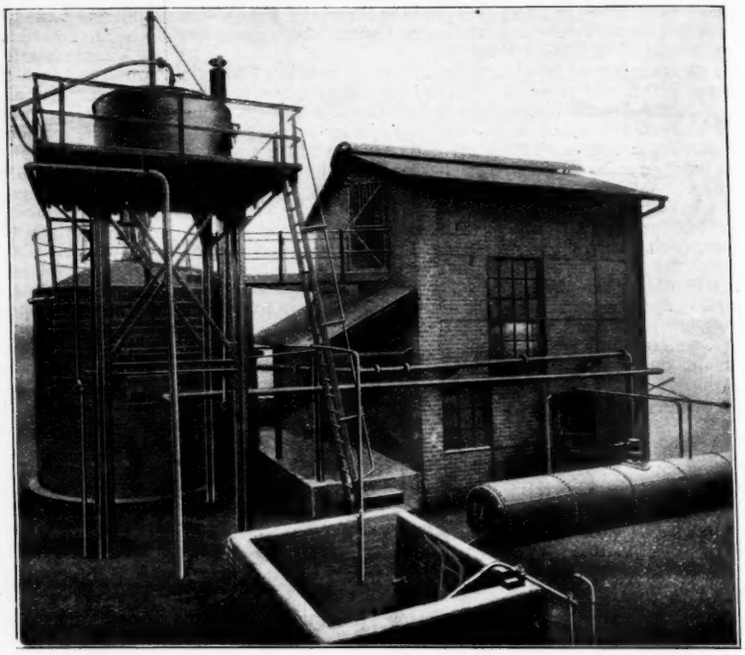
TAR DISTILLING ON GAS-WORKS.

The Power-Gas Corporation's Plant.

A PLANT to enable gas managers and other producers to distil their own tar has been placed on the market by the Power-Gas Corporation, Limited, of Stockton-on-Tees: and the accompanying illustrations are of an installation at the Saltley works of the Birmingham Corporation Gas Department, designed to deal with the tar from a 90-ton battery of Mond producers, which supply gas for coking the charges in a battery of 66 bye-product ovens. In actual practice, however, the tar plant has been proved to be well above this duty. It will be noted that it is entirely self-contained, and takes up comparatively little ground space. It is moreover claimed to be simple to operate, and either pitch or dehydrated tar suitable for road-making can be produced as desired.

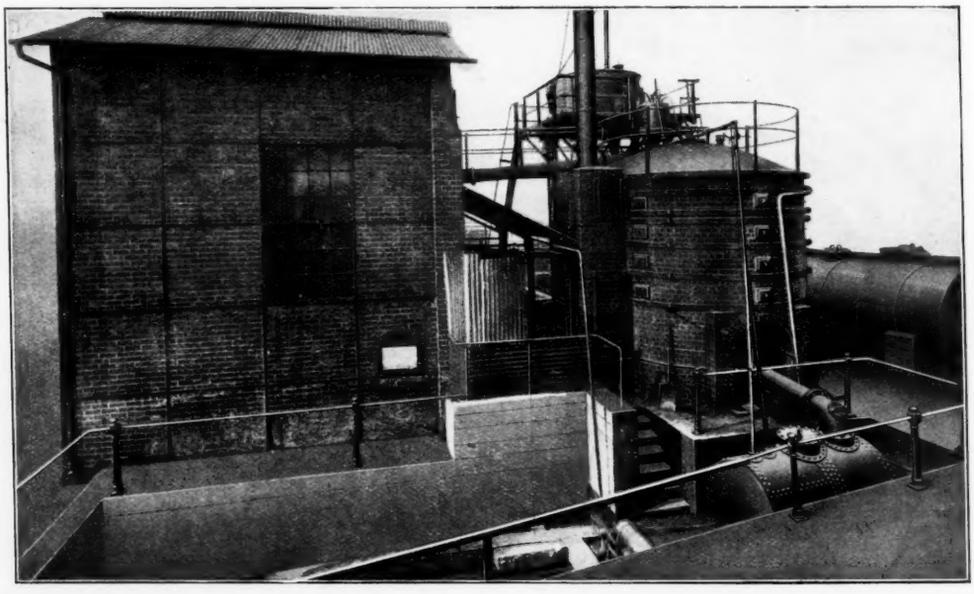
The still is conical in shape, terminating in a circular parallel portion at the bottom, which forms a receptacle for the pitch or dehydrated tar. The top is closed in by a substantial dished plate, with a manhole and cover at the centre. In the interior, and on the inclined portion of the shell, concentric steel rings, spaced a certain distance apart, are riveted, forming trays over which the mixture of tar and water flows. From the pre-heater the tar is conducted on to a steel tray, nearly as large as the diameter of the still, with an upturned edge about 1 inch deep, so that the heat in the still drives off a large percentage of the water before the tar finally overflows the outside edge on to the concentric rings previously mentioned. The still is fitted with safety valve, and special arrangement at the bottom which comes into immediate action in case of undue pressure.

The still is designed on the film system, which enables it to work more than twice as fast as an ordinary pot still. It is fixed in a fire-brick setting, having special-shaped fire-bricks placed next to the conical steel shell wherever the heat is applied. With this arrangement, it has been found that over-heating rarely takes place, and the chance of cindering is thereby reduced to a minimum. The still works under vacuum, as usual. The condensate is led off through a condenser into the receiver, where the oils settle out. The pitch is collected in the pitch-cooler in the ordinary way, and run off when sufficiently cooled. The incondensable and noxious fumes are passed through the vacuum pump, conveyed underneath the furnace of the still, passed through the fire, and destroyed.



It is stated that stills have been working continuously day and night for over eighteen months, without cleaning or opening out. When cleaning is necessary, the still is opened top and bottom, which allows a draught of air to pass through. Consequently there is no danger of a workman being "gassed." As regards labour, only one man is required for operating a still to deal with 30 tons of tar per day. The plant is economical in water and fuel; and special firing at stated periods is not necessary, as in a pot-still plant. In addition, the plant is so designed and arranged that it can be shut-down practically at any time and started up the following morning without loss of time. This is important for small works, where an all-round night shift is not in operation.

It may be added that the possibilities of the apparatus are not restricted to plants of large capacity. Practically any size of still can be made, to treat 1 ton of tar per day upwards. The plant deals with tar direct from the works, containing up to as much as 40 per cent. of moisture; and it is pointed out that it thus dispenses with the dehydrating apparatus required with a pot-still plant.



Garcke's "Manual of Electrical Undertakings and Directory" for 1915-16.—There has been received from the Electrical Press, Limited, a copy of the nineteenth edition of this work, which has just been published. As usual, it contains a vast amount of statistical and general information relating to many undertakings. In addition to war comments, there are various special articles of importance dealing with electrical matters, and some valuable maps, including a large one of the United Kingdom (as a separate supplement) showing the situation of all lighting, power, and traction undertakings. The price of the volume (which extends to some 2000 pages, with 48 maps) is 21s. net; and it is published at Nos. 13 to 16, Fisher Street, W.C.

POWER PRODUCTION.

The "£ s. d." of the Question.

By H. C. Widlake, M.J.Inst.E., of the Plymouth and Stonehouse Gaslight and Coke Company.

(*Continued from p.* 130.)

Factory Driving.

As a general rule, the scope of the ordinary provincial gas undertaking, so far as the sale of gas for power purposes is concerned, will be confined to the moderate-sized factory, whose maximum demand does not exceed (say) 100 B.H.P. Producer-gas plants are not at present sufficiently developed to enable them to compete with the gas-engine working on a town supply so far as small power installations are concerned.

A regular supply of gas of high and constant calorific power obtainable instantly day and night without the risk, trouble, increased capital outlay, and constant attention involved in the use of producer gas, is a decided advantage. Apart from the additional outlay involved in installing the producer, scrubber, &c., the engine itself is more expensive, and takes up a greater amount of space, on account of the fact that an engine running on suction gas can only develop about 75 per cent. of the power output attained when running on town's gas of an average calorific value.

Disadvantages of Electric Motors.

The persistent efforts on the part of electrical contractors and supply authorities to persuade the proprietors of quite small factories to go in for group, or even individual, driving by means of electric motors would be amusing if such a course were not characterized by so callous a disregard for the finances of the unfortunate individual concerned. The fact of being able to put any particular machine into operation at any time without reference to another machine or machines is undoubtedly an advantage; but practical considerations do not, except in very special cases, permit of such an arrangement being adopted.

The driving of isolated machines by separate motors means that each motor must be so rated as to be able to supply the maximum amount of power demanded by the particular machine to which it is coupled. This would mean that during the greater part of its time a small, and consequently a comparatively inefficient, motor would be operating at a poor efficiency under an uneconomical load factor.

The extent to which it is wise to adopt isolated or group driving can only be decided by a consideration of the circumstances peculiar to each particular case, and by close attention to the load factor under which it is estimated each machine will operate. The maximum advantages offered by group driving can only be realized by a judicious grouping of the machines at the time of their installation in such a manner as will permit of certain groups being kept working at their highest efficiency at a time when the conditions of working require other groups to be shut down.

Where the daily load factor on all the machines is equal, and no particular group of machines is likely to be working when others are standing idle, the adoption of group driving, so often recommended by interested persons, simply to save [*sic*] the transmission losses in connection with (say) three or four main driving belts is a suicidal policy so far as the commercial aspect of the matter is concerned.

Even with group driving, belts and shafting, with their attendant and unavoidable losses, are inseparable, and the transmission losses evaded by the abolition of three or four main drive belts will be more than swallowed up by the increased capital and depreciation charges, to say nothing of the lower efficiency of the small group motors. This is a purely technical argument, and does not touch at all upon the ever-present question of the higher cost of electrical power.

Gas-Engines for Generating Current.

For special purposes, and more particularly where large ranges of speed control are necessary, group or individual driving may become a necessity; and in such cases it is up to the progressive gas engineer to press for the installation of gas-driven generating sets, by means of which he should be able to show that electrical energy can be generated at a far cheaper rate than it can be obtained from a local authority, to say nothing of the advantage of a supply totally independent of outside influence and mishap.

Moving picture exhibitors have not been slow to take advantage of the economic possibilities of the gas-engine in this respect. Needless to say, however, the saving effected by the installation of private gas-driven generating sets is not confined to members of this particular industry, but can be accomplished in connection with any other business where the proprietors are large users of electricity for power or lighting purposes, and, in the latter case, do not feel disposed to use the cheaper, more hygienic, and equally efficient form of lighting to be obtained by the direct use of gas and inverted incandescent mantles.

As an example, let us take the case of a 30 B.H.P. gas-engine coupled to an electric generator for the supply of lighting and power to a small factory. Working at its normal load of 30 H.P. this engine would be able to transmit $30 \times 746 = 22{,}380$ watts to the dynamo shaft, if the set were direct-coupled. Assuming a dynamo efficiency of 85 per cent., we find that out of this 22,380 watts, 3357 would be lost in heating and other losses in the machine; the remaining 19,023 watts, or (say) 19 kilowatts, being available for transmission to the factory plant and lights.

From Table I. (*ante*, *p.* 80) we find the hourly consumption of this engine at full load would be 609 cubic feet; while the cost for gas alone would be 9·7d. The output of the dynamo during this time, assuming 100 per cent. load factor, would be 19 kilowatt hours, or 19 B.T.U. The cost per unit for gas alone would therefore be 0·51d. This figure, it must be remembered, would be still lower in connection with larger sets having a higher engine and generator efficiency.

Electrically Lit Factories.

It often happens—due sometimes to ancient lethargy on the part of the gas supply undertaking—that a factory driven by gas power is either wholly or partly illuminated by electricity; and in view of the fact that the electricity supply authorities offer specially advantageous terms to daylight consumers, it is a very difficult matter to induce the proprietor to scrap his electrical fittings in favour of the rival power. Such cases may be advantageously handled by pointing out to the proprietor that a small dynamo driven from the line-shafting will generate all the power likely to be required at a cost of something under ½d. per unit, according to the rate charged for gas for power purposes.

The provision of a change-over switch will permit of a supply being drawn from the public mains when the main shafting is stopped; but a more economical alternative would be the provision of a small gas-engine rated to drive the dynamo independently for the few lights that would be required at such a time. In practically all cases it will be found that it will pay the proprietor of the electrically lit factory to generate his current by a gas-driven dynamo; and the economy attendant on this practice should appeal very strongly to garage proprietors.

The increasing use of the electric self-starter, electric head and side lamps, &c., and the resultant necessity for the employment of high amperage accumulators, is having a considerable effect on the electricity charges in connection with garages taking a supply from a public main and, by means of a small (and hence uneconomical) motor generator set, convert the current to the pressure and character that are necessary for accumulator charging.

The Coupling of Gas-Engines.

Much has been made in the past of the extremely even turning movement which is the characteristic of the electric motor and of the turbine, and which gives these machines an advantage over all reciprocating engines. The high degree of perfection to which the multiple cylinder gas-engine has been brought in this respect is strikingly illustrated in fig. 1, which shows a cyclical speed variation record taken from a three-crank tandem vertical gas-engine by the Westinghouse Company, working at or near full load. It will be seen that the maximum fluctuation in speed of the flywheel is 0·28 per cent. during the period in which a complete cycle of work takes place in one cylinder—namely, in two revolutions.

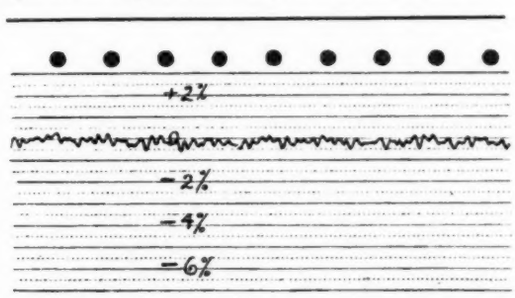


Fig. 1.—Cyclical Speed Variation Record taken with Horne's Tachograph from a Three-Crank Six-Cylinder Westinghouse Vertical Tandem Gas-Engine (at about full load).

There is no doubt that so fine a degree of speed variation is attributable to the tandem cylinder design adopted by the Westinghouse Company in the design of their high-speed verticals. In a four-cycle engine having one crank per cylinder, the crank receives an impulse every second revolution, or on every fourth stroke of the piston. With the tandem arrangement, however, in which two pistons (coupled in tandem) drive on to each crank, one piston is delivering an impulse to a crank while the other is on its suction stroke, from which it will be obvious that the crank receives an impulse every revolution.

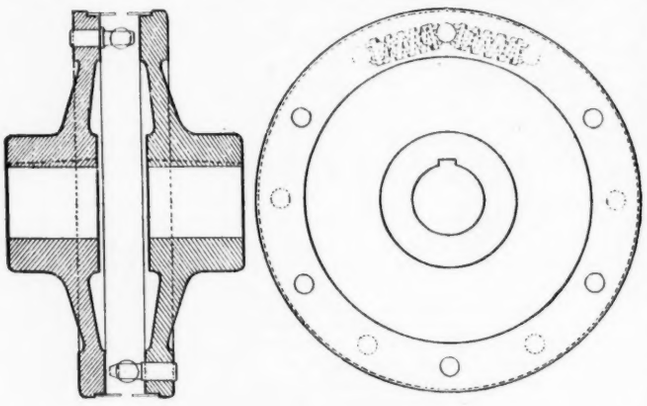
The tachometer record above referred to shows the value of having a large number of impulses of comparatively small intensity. Such fine regulation cannot, of course, be expected from the small single-cylinder gas-engines with which the usual small factory is equipped; and it may be that in special cases where an engine of this type is not belt-coupled to its work but has to drive direct on to its load, as in the case of electrical generators, compressors, pumps, fans, and blowers, the power user is faced with the problem of coupling an engine having a varying angular velocity with a machine in which this factor is quite even.

Let us take the case of a dynamo direct-coupled, by means of a

rigid coupling, to the driving shaft of a gas-engine. At full speed the heavy rotating armature of the dynamo will tend to resist any cyclical variation on the part of the engine; the rotating fly-wheel of the engine will in itself form a reservoir of power, due to the energy stored up in its heavy rim. These two forces will be constantly and regularly falling out of synchronism with each other, according to the cycle which the engine is performing at any particular moment; and the result of such loss of phase will be the passage of a large amount of energy through the coupling and its bolts.

To illustrate this argument, it may be mentioned that the job on which the coupling to be presently described proved its worth comprised a 150 H.P. gas-engine, having a cyclical irregularity of 1/40, coupled to a fan weighing 7½ tons, which, it was estimated, when running at 160 R.P.M., had a stored energy of about a million foot-pounds. At full speed the fan would tend to resist any cyclical variation, whereas the gas-engine was an impulse machine with fly-wheels of 950,000 foot-pounds energy at full speed. Under these conditions, the engine would attempt to store half its reserve energy in its fly-wheels and half in the body of the fan; and it was calculated that this flow of energy through the coupling occurring once every two revolutions would be equal to over 1500 momentary H.P. Such conditions are happily confined to special cases, and have in the past constituted a grave objection to the direct coupling of a gas-engine (particularly of the single cylinder type) to a machine having constant angular velocity.

The solution to the problem mentioned above was found in the adoption of the "Vennell-Coster" coupling, consisting, as will be seen from fig. 2, of two identical discs provided with alternate



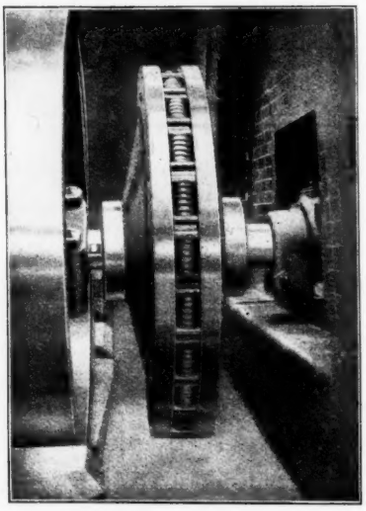


Fig. 2.—The Vennell-Coster Flexible Coupling.

projecting studs, between which are special springs for action or reaction purposes. The springs are arranged around the periphery of the discs, and are compressed to a predetermined extent, which neutralizes any tendency to vibration either of the springs themselves or of the connected parts. These springs are so arranged that their axes lie direct in the line of thrust, which ensures, in conjunction with their being mounted upon studs, their not being twisted when taking up the load. While it is of great value as a coupling between loads having different cyclical variations, its use in correcting misalignment in shafting, in reducing the jar and vibration incidental to the use of gearing, in severe reversing drives, and in all cases where a buffer device is needed to take up back-lash and shocks, renders it an extremely valuable and, at the same time, very simple device.

High-Power Gas-Engines.

In no phase of the development of the high-power internal combustion engine has improvement been more marked than in the production of the high-speed vertical gas-engine, which, up to a very short time ago, was generally believed to be in the experimental stage. The engines have gained for themselves a very fine reputation for reliability, and are rapidly becoming appreciated by power users, not only in this country, but in colonies which, from the engine manufacturers' point of view, are as far distant as they can be.

The extent to which these engines are being used for important public services in distant parts of the British Empire is a striking proof of the high degree of reliability which this type of power developer has attained. Any type of prime mover for such a service must possess two features. It must be absolutely reliable in its working—for a public supply must not be liable to interruption—and it must not be liable to any serious damage, in view of the time and expense involved in the replacement of parts. In many cases high-speed gas-engine installations have superseded old steam-power plants, always resulting in a return in commercial service and general economy in working which greatly outweigh the capital expenditure involved.

The high commercial efficiency and general economy of the large power gas-engine as a prime mover are now generally recognized; and when we consider the simplicity of construction and general increased reliability which have now become features of the English high-speed vertical engine, it must be admitted that this engine shows a decided all-round superiority to other forms of prime movers.

Where town gas is not available, producer gas is generally used; but even for large powers there is much to be said in favour of an unlimited supply of clean gas of unvarying calorific value, such as is obtainable from the mains of a gas supply undertaking. Where town gas is used, the only accessory required is a meter. The space taken up on a steam plant by boilers, economizers, hoppers, &c., &c., together with the enormously increased running, attendance, capital, and depreciation charges which these necessary accessories entail, is entirely saved.

The remarkable ease with which these high-speed gas-engines can be started-up renders them particularly suitable for public services, where the occurrence of a sudden peak load, or the failure of a generating set, makes it a matter of vital importance that another set should be got under load immediately. The many difficulties and dangers attendant on rushing a large generating set up to speed and right on to load will be appreciated by "Journal" readers who have had any central station experience with steam plant.

No preliminary warming-up is necessary—the start being effected by turning the engine to the starting point and opening the valve to the compressed air container. With a good make of engine the storage capacity of the starter container is usually such as will permit of about a dozen starts being made without the necessity for recharging.

The present tendency in this country in high-power gas-engine design is in the direction of the high-speed multiple cylindered type; the large slow-speed horizontal gas-engine of Continental design having found but little favour. The ordinary small horizontal engine of the type forming the main subject of this article usually has a cyclical variation of 1/30 to 1/40, and is quite suitable for driving factories in which the trade process does not require a very fine degree of speed regulation.

The provision of a specially heavy flywheel on these engines reduces their cyclical variation to about 1/50, and renders them suitable for the driving of direct current generators (either singly or in parallel); the provision of a suitable flexible coupling or a belt-drive having a tendency to further absorb this degree of irregularity. For the driving of alternators in parallel, however, a much finer degree of regulation is required; and it is in this connection that the value of the multiple cylindered high-speed gas-engine makes itself felt.

(*To be Concluded.*)

Gas Consumption in Germany.

The Central Gas Publicity Organization of Berlin announces that statistics collected from 772 gas-works in Germany show a decrease in the gas produced in April last of 2·7 per cent., compared with April of last year. The corresponding figures for February and March last were 4·9 per cent. decrease referring to 753 works, and 4·4 per cent. decrease referring to 776 works, respectively. The figures for January were given in the "Journal" for May 18, p. 380; and those for December and earlier months since the outbreak of war in the "Journal" for April 27, p. 204. It is to be observed that the considerable falling off in the consumption of gas which was experienced in Germany during the closing months of last year has now to a large extent been retrieved. Doubtless this is due to the measures throughout the country to supply gas to households which have hitherto been dependent on oil, which has become very dear and scarce in Germany. This matter is referred to in the annual report of the German Association of Gas and Water Engineers which appears on another page of to-day's "Journal."

GERMAN ASSOCIATION OF GAS AND WATER ENGINEERS.

Annual Meeting in Berlin.

The Fifty-Sixth Annual General Meeting of the Association was formally held on June 30 in the new premises in Berlin of the Association of German Engineers. The following account of the proceedings is taken from the official report published in the "Journal für Gasbeleuchtung" of the 10th inst.

President's Opening Remarks.

The President of the Association, Herr F. Reese, the Manager of the Dortmund Corporation Water-Works, opened the meeting (it was attended by about 250 of the members) at 9.30 a.m. on June 30. In his opening address, he said he was gratified to see so large an attendance, having regard to the circumstances in which they were meeting; and he welcomed the presence of two members of the Imperial Standards Committee—Councillors Meyer and Zingler. The intention expressed at last year's gathering at Munich, that the general meeting this year should be held at Dortmund had been frustrated by the outbreak of war. It had then been decided merely to hold a formal meeting in Berlin, to which city railway connections were good, despite the war, and to give up for this year the festivities and excursions which were customary adjuncts of the annual meetings. After expressing the hope that "the purpose of their enemies, born of envy and jealousy, of destroying German culture, would be frustrated, and that an honourable peace would be the reward of their [the German] victory," he said that, among many other technical men, the Manager of the Instructional and Experimental Works and General Secretary of the Association, Dr. Karl Bunte, was serving in the field. His father, Professor H. Bunte, who had formerly been General Secretary, had kindly undertaken again the duties of this office, for which service the meeting thereupon expressed thanks by acclamation.

Greeting from the Swiss Association.

A telegram of greeting from the Swiss Association of Gas and Water Engineers was received and acknowledged by telegram.

Report and Accounts.

The annual report of the Council—of which some particulars are given later on—was taken as read and accepted, as was also the statement of accounts of the Instructional and Experimental Gas-Works. The accounts of the Association and of its Benevolent Fund and the Simon-Schiele Fund were also presented and passed. Estimates of receipts and expenditure for the ensuing year were next laid before the meeting by Herr Heidenreich, the Secretary of the Association, and were approved.

Committees' Reports.

The reports of the Special Committees of the Association, which, with the exception of the Tubes or Pipes Committee, had been included in the annual report, were received and approved. Herr Hase, of Lubeck, the Chairman of the Tubes Committee, explained some points in the report, of which copies were before the meeting. He expressed the hope that the investigations on the use of cast and wrought iron or steel tubes, as well as the efforts which were being made to come to an understanding with the German Cast-Pipes Union, the Foundry Union, the Association of German Ironmasters, and the Association of German Engineers as to the lengths of cast-iron pipes and distinctive markings of different mains, &c., on plans, would later have satisfactory results.

Mr. Körting, of Berlin, then moved, on behalf of the Council, the election of President, other officers, and members of Council for the ensuing year. Herr Reese, not being eligible for re-election as President, is succeeded by Herr M. Hase, the Manager of the Gas, Electricity, and Water Works of the Corporation of Lubeck. Three vacancies on the Council were filled by the election of Herr Reese, of Dortmund, Herr Prenger, the Manager of the Gas, Water, and Electricity Works of the Corporation of Cologne, and Herr M. Sorge, formerly Manager of the Thorn Gas-Works. It was also decided to bestow the Bunsen-Pettenkofer Award of Honour on Dr. von Gruber, Professor at Munich, for his investigations on the Hygiene of Gas Lighting.

Employment of Prisoners of War.

Herr Lichtheim, of Altona, then opened a discussion on the "Extent and Results of the Employment of Prisoners of War on Gas-Works." Herr Martin, the Manager of the Erfurt Gas-Works, said that his experiences had on the whole been favourable, though the work done by the prisoners was considerably less than that of skilled men. About twenty prisoners performed work which otherwise would be done by fourteen men. The work done could, however, be considerably increased by supplementing the small wage paid, which, after all deductions, amounted to 62 pfennige (7½d.) per week. Herr Gadamer, the Assistant Manager of the Berlin Corporation Gas-Works, expressed himself in much the same sense as to his experiences with some Russian and French prisoners of war, as did also Herr Reese, of Dortmund, on their employment on day shifts, in which the work done had been considerably increased by paying wages agreed upon. Herr Bolstorf confirmed Herr Martin from his experiences at Essen. Herr Anklam, the Manager of the Water-Works at Friedrichshagen, had had unsatisfactory results from certain civilians detained at Rummelsburg.

Vote of Thanks.

The President announced that, having regard to the war, it appeared undesirable to fix upon a place for next year's meeting of the Association. Mr. Körting having proposed a vote of thanks to Herr Reese for his services during the three years in which he had occupied the presidential chair, the meeting ended about 11 a.m. The majority of those attending the meeting spent the evening together at the Zoological Gardens.

REPORT OF THE COUNCIL FOR THE YEAR 1914-15.

The following is a summary of the contents of the annual report of the Council, referred to in the foregoing notice.

Last year's meeting, held at Munich in connection with the German Gas Exhibition, was attended by many foreign gas engineers; but even while it was being held the shadow of the Sarajevo outrage fell on Europe, and a few weeks later war had broken out. Since then all the thoughts and power of the people have been directed to one object; and though the war is not over, its horrors have been kept out of Germany. As a consequence, there has been no serious interference with the supply of town and country with gas and water—the matter with which the Association is specially concerned. In the difficult conditions, which claimed all the strength of those of the Association's members who were not called to the colours, the special work of the Association has suffered; but, on the other hand, its members have been able to co-operate in measures for the benefit and defence of the country. The great importance of the gas industry and the allied coke industry in both war and peace has been clearly established. The scarcity of petroleum, which is almost entirely imported, has brought home to the mass of the populace and to the authorities with unprecedented force the great importance of gas. Numerous municipalities have taken steps to facilitate and extend the use of gas—such as abolishing all obsolete scales of charges, reducing prices, putting in prepayment meters and services free of charge or for small rentals, &c.—which will continue to bear rich fruit in times of peace. The war also has given an enhanced value to the bye-products. The supply of nitrate being cut off, ammonia has served to take its place for agricultural purposes, and thus ensured the food supply of the people. It has also become a new source for the manufacture of nitric acid, which is required for the production of both propulsive and bursting charges for the army. As regards tar products, benzol, toluol, &c., serve to replace imported petrol, and as raw materials for the manufacture of high explosives.

International Commissions.

Work of an international character, with which the Association has been connected in past years—such as the International Commission on Illumination, and the International Commission on Screw Threads—has been arrested. Other Commissions, dealing with matters not of a very pressing character, have ceased deliberations for the time being in order not to overtax members, who want all their strength for other work. But the Association have not altogether interrupted activities of this class; and the exceptional conditions now prevailing have raised a number of important and interesting questions which they will investigate in quieter times.

Hygienic Aspects of Gas Lighting.

The Munich Exhibition having directed attention to the importance of rectifying defects in apparatus which might favour the opposition of the ignorant (both authorities and individuals) to the more extended use of gas, the Association suggested that the Hygienic Institute of Munich University should undertake a scientific investigation of the hygienic aspects of gas lighting. This investigation has been carried out by Professor von Gruber, who has proved that the alteration of the air by gas lighting, even in small rooms with unfavourable conditions, can be quite disregarded from the hygienic point of view. These investigations, in conjunction with others made at the Instructional and Experimental Works on the gaseous products of gas heating-stoves, and at the Chemical-Technical Institute of the Carlsruhe Technical College on the products of combustion from gas-flames, afford a scientific basis for combating unreasoning prejudices against the use of gas. The Association will give the widest possible circulation to the results of the researches.

Rules in Regard to Gas-Heating Apparatus.

Some years ago, the Association issued printed rules for the proper construction, installation, and handling of gas-heating apparatus, which had been compiled by the Committee on Heating. These rules have been widely adopted and generally accepted; but the valuable knowledge acquired and advances made in the construction and in the duty of such apparatus in recent years rendered it desirable to make a thorough revision of the rules before issuing a further edition of them. At the request of the Council, Dr. Schilling submitted a scheme of revision, which was considered at a meeting held in Berlin on May 29, of the members of the former Committee on Heating and representatives of manufacturers of gas-heating apparatus. It was then

decided that a thorough revision of the rules was necessary in order to bring them up to date and to avoid misunderstandings and overcome difficulties which militated against the employment of gas-stoves. These difficulties frequently arose from antiquated regulations of local or state authorities on the disposal of the products of combustion. In this connection the Association successfully petitioned the Government of one German state to cease to apply to gas-stoves regulations which had been issued in 1882, and were clearly intended only to apply to stoves using solid fuel. This is not a unique case; and the Association are endeavouring by explanations to secure the removal of such difficulties in the way of the use of gas.

Standard Lengths of Pipes.

The Special Committee on Pipe Questions last year prepared a detailed circular of inquiry with a view to collecting information on the use of cast and wrought iron or steel pipes and the experiences gained with them; and the circular-letter had been sent this spring to all the gas and water works represented in the Association. By the 1st of June last, 180 answers (some very full) had been received. They contain much valuable information, for which best thanks are given to those who have furnished it in such busy times. Messrs. Hase and Wahl have been entrusted with the task of collating the information for report. The question of the distribution of gas under high-pressure having been raised afresh, Herr Eisele has undertaken to prepare a scheme for its investigation. The Committee has also had under consideration a communication from the Prussian Ministry of Public Works forwarding a petition from the Cast Pipe Makers' Union asking for an extension of the standard lengths of cast-iron pipes which had been settled by the Association and the Association of German Engineers. There being a consensus of opinion against the extension, the two Associations replied that the standards already settled by them ought to be adhered to. The Union persisting in its appeal, however, a conference was arranged between the bodies concerned, which took place at the Prussian Ministry on Jan. 6 last; but no agreement was arrived at, as the Pipe Makers' Union wished to accept the standard lengths merely as minimum lengths which could be exceeded at their discretion. On March 22 the Committee, with the approval of the Council of the Association, decided to adhere to the definite standard lengths, and anticipates that the German Association of Engineers, to which it has recently communicated this decision, will give its adhesion to this attitude.

Electrolysis.

The question of the connection of lightning conductors to gas and water mains has been raised afresh, and the Council has collected in the course of the year a lot of data thereon with a view to further consideration of the matter, which Dr. Scheelhase and Herr Terhaerst have undertaken to go into as soon as times are quieter. Another question which has been kept in abeyance is that of the protection of gas and water mains from vagrant electric currents. The rules agreed upon by a Joint Committee on Electrolysis have not been generally followed, because they lacked legislative force, and the Association therefore petitioned the Minister of Public Works to alter the regulations for the construction and operation of tramways in the sense of these rules. No decision has yet been given by him—not a matter for surprise in present circumstances. Meantime, as the stock of copies of the Rules has been almost exhausted, the Council has ordered a further supply, which it will distribute freely.

Water Supply of German Towns.

Data collected by the General Secretary as to the chemical quality of the water supply of German towns of over 10,000 inhabitants have been printed as an appendix to the report of the Water-Works Committee, and will be published shortly. Much trouble in assembling these data was, however, caused through want of uniformity in the methods of analysis and way of stating results, and the Association is taking further steps with a view to securing uniformity in these respects by all water analysts.

Instructional and Experimental Works.

The Instructional and Experimental Works of the Association, at Carlsruhe, having in the previous year foreshadowed special development of its work in the direction of the investigation of all classes of apparatus for the consumption of gas, it was decided to put in hand an extension of the works to provide accommodation for these investigations. The carcase of the new building had been all but finished when war broke out, and the Superintendent (Dr. K. Bunte) and the whole staff of the works were called to the colours. Building operations were continued only so far as was necessary to keep out wind and weather. Experimental work in progress was transferred to Dr. Terres, working under Professor H. Bunte at the Chemical Technical Institute. Through the latter, also, many technical questions from members of the Association were answered, and this branch of operations of the Experimental Works was thus kept active. In connection with the gas exhibition, a conference of gas chemists was held at Munich on the 6th and 8th of July last year, which was attended by 46 chemists, who discussed a number of questions which had been prepared for the conference by the experimental works. It was decided to arrange for similar conferences in future years. Herr Reichard has continued to look after the finances of the works; and his services in this direction, especially in regard to the extensions, have been greatly appreciated.

"Award of Honour."

In accordance with the decision of last year's meeting at Munich, the Bunsen-Pettenkofer "Award of Honour" was conferred upon Dr. W. von Oechelhaeuser and Herr Ries for their notable services to the gas industry and to the Association.

Gas and Water Statistics.

The thirty-fifth volume of gas statistics relating to the year 1913 (or 1913-14) contains particulars of 394 undertakings, compared with 441 in the preceding volume—a diminution due to the inability of some works to furnish information owing to the depletion of their staffs through the war. The omissions are chiefly small or medium-sized works, with some of the foreign works (Riga and Helsingfors) hitherto included in the statistics and works in districts occupied or threatened by hostile forces (Lyck, Marggrabowa, Eylan, Ratebor). On the other hand, six works appear in the statistics for the first time. Forty-four works out of the 394 reported a falling off in gas consumption—due to a decrease in use for lighting which in these cases was not offset by increased use for other purposes.

Questions for the twenty-fifth compilation of water supply statistics were sent out on Nov. 5 last to 478 works; and replies have been received from 378, as compared with 415 works which supplied information for the last volume.

Membership Roll.

The deaths of nine members have been made known since the last report was issued. The war has so far claimed no victims from the ranks of individual members; but there have been losses among the representatives of corporate members (municipalities, companies, &c.). The total membership shows an increase of five. At the end of the year it was made up of five honorary members, 885 members (439 personal, 446 corporate), and 189 associates (makers of apparatus, &c.). A list of subscribers to the scientific purposes fund of the Association is given. [It includes the "Gas Company" at Berlin, evidently meaning the local administration of the works of the Imperial Continental Gas Association there, though the Association's name is given when the contribution from its Hanover works is recorded.] It has been decided to make no election on the Schiele Foundation, but to allow the funds to accumulate.

District Associations.

There are eight district Associations affiliated to the German Association.

1.—The Brandenburg Association of Gas, Electricity, and Water Engineers finished the year with a total membership of 188—a decrease of five. They held their annual meeting on March 20 to 22 last, in Berlin, under the chairmanship of Herr Kümmel, of Charlottenburg. The programme of this meeting was given in the "Journal" for March 30 last (p. 789).

2.—The Mid-Rhenish Association of Gas and Water Engineers on Oct. 1 had 270 members of all classes, as against 272 twelve months previously. It was decided not to hold the fifty-first general meeting, which, before the outbreak of war, had been fixed for Sept. 17 and 18 last at Neustadt in the Harz Mountains. The Association have contributed £150 to the Red Cross funds. The Chairman is Herr F. Göhrum, the Manager of the Stuttgart Gas-Works.

3.—The Association of Gas and Water Engineers of Silesia and Lusatia should have held their forty-sixth annual meeting at Reichenberg, in Bohemia, on Aug. 12 to 14 last; but on the outbreak of war all the preparations for it were cancelled. It is not contemplated holding a meeting until the war is over, when the first gathering will be at Reichenberg.

4.—The Association of Gas, Electricity, and Water Engineers of the Rhine Province and Westphalia had on April 1 last 383 members of all classes. The customary autumn meeting was given up; but a special war-time meeting was held at Cologne on Feb. 13, at which Herr O. Meyer, the Manager of the Dortmund Gas-Works, was elected Chairman for the ensuing year. Herr Ohly, the Manager of the Commercial Association of German Gas-Works, gave an address on the "Industrial Difficulties Created by the War." It was decided to start a fund for the relief of members and their dependents in necessity owing to the war, and a contribution of £500 from the Association was voted to the fund.

5.—The Bavarian Association of Gas and Water Engineers decided not to hold a general meeting as in previous years.

6.—The Baltic Association of Gas and Water Engineers decided to hold their forty-second annual meeting at Munich shortly before the general meeting of the parent Association in July last year. Herr Handke, the Manager of the Stolp Gas-Works, was elected Chairman in succession to Herr M. Sorge, the Manager of the Thorn Gas-Works. It was decided to hold the next meeting at Allenstein.

7.—The Association of Gas and Water Engineers of Saxony and Thuringia held their sixty-second general meeting at Leipsig on May 8 last. Herr Schäl, the Manager of the gas and water works at Aschersleben, was elected as Chairman in succession to Herr Jäckel, the Manager of the Plauen Gas-Works. Two addresses were delivered—one by Herr Lempelius, the Manager of the Central Gas Publicity Organization, on "Experiences in Working Gas-Works in War-Time," and the other by Herr Ohly, on "Industrial Difficulties Created by the War." These addresses gave rise to a lively discussion, to which twelve of the members

contributed, and a debate ensued on the lighting of barracks and railway stations and the use of coal gas by the State Railways for lighting passenger coaches.

8.—The Association of Gas and Water Engineers of Lower Saxony gave up their sixteenth annual meeting, which should have been held at Altona on Sept. 10 to 12 last. There has been no alteration of membership during the year, and the former officers and Council have provisionally retained office. The Association have contributed £50 to the Benevolent Fund of the German Association of Gas and Water Engineers, to be applied only to the relief of members who may be in necessity owing to the war.

DUTCH GAS MANAGERS ASSOCIATION.

Annual Meeting.

[From a Dutch Correspondent.]

The Forty-Third Annual General Meeting of the Dutch Gas Association was held at Nimeguen on the 7th and 8th inst.—Heer J. E. H. Bakhuis, of the Hague Gas-Works (the President), in the chair.

On the evening of the day preceding the meeting, the Lord Mayor received the members at the Town Hall, and in welcoming them pointed out that, though it was no time for festivities, he heartily approved of the meeting taking place. In these periods of stress, conferences and deliberations were necessary to meet the difficulties which cropped up in all directions. More especially gas managers had to struggle against grave troubles connected with the supply of coal—the disposal of the bye-products giving rise also to anxiety. It was with great regret that managers were obliged to look on their rapidly disappearing profits. But all of them should persevere; and if difficulties were met with energy, it would be possible to look back, when more peaceful times returned, on this period as one in which men had shown themselves at their best. The President thanked the Lord Mayor for his remarks.

The following day, the meeting of the Association was opened with

An Address by the President.

The President, addressing the members, mentioned the numerous difficulties that have confronted the gas industry owing to the war—more especially the supply of coal and the disposal of bye-products. Nevertheless, he said, the greater number of the gas-works passed the winter tolerably well; and when, in the weeks between winter and spring, the time of greatest shortage arrived, the Royal Auxiliary Committee and the Industrial Committee were in a position to give help. From this combination there resulted the Bureau of Coals, which had proved to be a great boon, more particularly to the small works. The readiness with which the coal merchants had joined the Bureau might be regarded as a deed of great patriotism.

Proceeding, the President referred in greater detail to the tremendous difficulties which had to be overcome. They ought, he pointed out, to be prepared for eventualities; and when it was not possible to get an adequate supply of proper gas coals, they must take what coal they could obtain—even the small coal from their own mines, mixed with bituminous coal. In all cases they must be prepared to modify their views with regard to quality, and to keep an open mind on the subject of gas prices. But they might certainly ask themselves what the future would bring. A decrease in the number of difficulties was not to be expected so long as the war might last. On the contrary, gas engineers had to prepare themselves for the most unexpected events.

It was probable that the war would have a stimulating effect on the future of the gas industry. With the belligerent countries, it had been shown how manifold were the interests served by gas. Take, for instance, Germany, where the industry had been able profitably to replace the shortage in oil by the greater use of gas. In their own country the consumption of gas had not profited; but, on the other hand, the use of coke had been increased by the shortage of anthracite—coke having thus become very much more popular in the past winter. He did not wish it to be understood that the consumption of gas had been seriously influenced by the war, because there were many towns where the demand had increased, in spite of serious times.

Though coal prices were high, prices of bye-products had risen too. Tar was on the up-grade; and ammonia had proved to be a residual of high value now that there was not a full supply of nitrate of soda. Sulphate of ammonia, too, would no doubt be used to a greater extent in agriculture than it was before the war. Nevertheless, coke should be regarded as the principal bye product; and it might be anticipated that next winter would find them without any stocks of this. However, the high coal prices had undoubtedly spoiled much of their effort—many towns having been obliged to raise the price of gas. This naturally interfered with the economical conditions of gas as compared with electricity, for the electric works were not suffering to such an extent from expensive fuel.

In concluding his speech (which was cordially applauded), the President emphasized the fact that the position of the industry is still very strong, and that although the horizon might not be absolutely unclouded, it is still clear enough. Every possible care must, he said, be taken to ensure the growth of the gas industry, and they would all hope that in this fight sight would not be lost of the ultimate goal of low gas prices.

Membership Roll.

Heer N. W. van Doesburgh, the Manager of the Leyden Gas-Works, having been unanimously elected an honorary member in recognition of his services as Hon. Secretary of the Association, and in connection with the Association's official paper "Het Gas," it was reported that there were seven honorary members of the Association, 335 ordinary, and 136 associates or extraordinary members. Subsequently the President stated that the Dutch Association had agreed with the French Association to act as intermediaries between the French gas-workers that are prisoners of war in Germany and their relatives in France—a suggestion which was cordially applauded.

Spent Oxide.

After this, a communication by Dr. van Oostrom Meyes, on "Spent Oxides," claimed attention.

The author began by pointing out that he was stating no new facts. The first point he intended to mention was that of the inactivity of oxide—why the purifying mass so slowly absorbed the sulphuretted hydrogen. The working agent in the purifying mass was the hydrate of iron—that was to say, generally only this form of iron salt was regarded as the active portion, and the oxide form was considered to be of little use. In order to secure some data on this question, he made various experiments.

He took a quantity of purifying material, air dried, and placed it in a glass tube in the usual manner; care being taken that the moisture formed during the reactions could not escape, but was taken up by some absorbent. After weighing, a stream of sulphuretted hydrogen was passed through the tube until the oxide was saturated with it. After this, the weight of the tube was ascertained, and it was found that the purifying mass had absorbed 16·2 per cent. of sulphuretted hydrogen. A second experiment was conducted with oxide which had been dried over a period of 24 hours, at 150° Celsius. In this case the absorption, calculated on the original wet mass, was 16·4 per cent. Subsequently another portion of the dried oxide was placed in a tube, and air with ammonia gas passed through it. After this treatment, the stream of air and ammonia was replaced by a stream of sulphuretted hydrogen, until the mass was saturated. The amount of sulphuretted hydrogen taken up was 18·7 per cent.

A further experiment was conducted with the original mass after it had been burnt slightly for sixteen hours; and after saturation with sulphuretted hydrogen, the result was an absorption of 20·5 per cent. This showed that oxide of iron took up sulphuretted hydrogen as well as did hydrate of iron, and also that by burning the oxide slightly its absorbent power had increased about 20 per cent. This did not prove that it was desirable to burn all purifying material before its use, for in this event the results would certainly be not at all striking. It merely meant that it was not the amounts of hydrate of iron and of oxide of iron that regulated the activity of purifying materials. When masses were not sufficiently active, one ought to seek the remedy in another direction.

There was yet a further question relative to the inactivity of purifying materials, and this was the real or supposed presence of acids. In order to gauge the influence of these, the author treated iron ore with dilute hydrochloric acid, washed out, dried, and subsequently saturated with sulphuretted hydrogen. The result was that the oxide took up 16·7 per cent. of sulphuretted hydrogen—a trifle more than was the case with the original mass. A similar experiment was made after the oxide had been exposed to a current of air saturated with acetic acid, when 17·8 per cent. of sulphuretted hydrogen was absorbed. One of the last experiments was made with bog ore, after it had been treated for an hour with carbon dioxide. In this case, the absorption was found to be 23·2 per cent. of sulphuretted hydrogen. The investigations indicated that, generally speaking, acids had no deleterious influence on the activity of purifying materials.

It became necessary, therefore, to pursue the inquiry in another direction, for most probably it was not the admixtures in the ore, but the form of combination of the iron salt, that regulated the activity of the purifying material. There were, he pointed out, several means at one's disposal to increase the activity of purifying material—the addition of ammonia by the temporary shutting-off of the wet purification, and solutions of sodium carbonate, copper sulphate, and copperas. Compared with natural bog ore, artificial purifying materials consisted chiefly of ferric hydrate chemically produced. In this material, the iron salt was able to take up sulphuretted hydrogen with great avidity; and this causes the high intensity of its action.

Often a mass of purifying material with 17 to 20 per cent. of sulphur showed no more inclination to absorb sulphuretted hydrogen, though it had only reached its point of saturation when the amount of sulphur has risen to about 45 to 55 per cent. This might be due to the circumstance that the ore is too coarse of grain. If so, the mass might be made thoroughly wet, so as to soften it, and afterwards treated with a weak soda or ammonia solution. But the defective absorbent power might also be due to faults in the wet purification. Though a temporary shutting-off of wet purification was favourable to induce action with inactive purifying masses, the permanent addition of greater quantities of ammonia gas to the oxide was deleterious to the working

of the dry purification. Defective wet purification might totally ruin a purifying oxide, and render it unsaleable.

The second point dealt with in the paper was the spontaneous combustion of spent oxide, and the measures which ought to be taken to prevent this. With the spent oxide freshly taken from the boxes, there was iron and sulphur on one side, and oxygen in the air on the other. They next had oxygen and iron combined, and free sulphur. It was the setting free of large numbers of heat units, together with the extremely finely divided state of the free sulphur, which caused the rise in temperature up to the burning-point of the sulphur. It was therefore only necessary to take measures to deal with this increased temperature, and when the chemical action was over, the oxide would have lost all danger.

In gas-works practice, there was in connection with dry purification, the point of cost. A great part of the purification costs was counterbalanced by the returns for the spent oxide; and the question was how to get the most for the spent material. Suppose the proportion between sulphur and prussian blue in the spent mass was normal, they had for the prices of blue in ordinary times the following figures. Taking the price of the spent oxide with 6 per cent. blue at 100 per cent., then 7 per cent. blue was paid with 140 per cent.; 8 per cent. blue with 195 per cent.; 9 per cent. blue with 260 per cent.; and 10 per cent. blue, with 345 per cent. When, therefore, they raised the amount of blue from 6 to 7 per cent.—an increase of 16 to 17 per cent.—the market value rose more than 25 per cent.; and if they were in a position to raise the amount of blue from 9 to 10 per cent.—only an increase of 11 per cent.—the market value went up 33 per cent. Of course, this was very natural; for when in the chemical-works the losses in the extraction of the blue were the same in weight for various masses, the loss on percentage was much larger with the inferior masses than with the oxides of high blue contents. Therefore, one ought not to be afraid in gas-works practice of using the oxide one turn more, so long as it showed some increase in temperature during regeneration; for the slightest increase in the percentage of blue richly repaid the labour costs.

In conclusion, the author reviewed the various methods of analyzing spent oxide—more especially the popular Knublauch plan and the somewhat modern Feld method. The Feld system, he said, gave figures that were about 1 per cent. in amount of blue higher than the Knublauch method.

The paper gave rise to an animated discussion.

Another contribution, dealing with "Oven Systems," by Herr H. Koppers, of Essen, was not given, owing to the war. After lunch, the question-box was opened.

The Question-Box.

The first question was: "Are there gas-works that have used blast-furnace coke for furnace-firing or boiler-firing; and what are the financial results?" There were, it appeared, gas-works which had used blast-furnace coke, because it had been offered from Germany at low prices; but no substantial economy had resulted. There was one important point in favour of the use of furnace coke—that it caused a greater amount of gas coke to be available for retail sale.

The second question was whether any members had practised the introduction of steam into horizontal retorts during the last hour and a half of carbonization. The general opinion was that this increased the gas production, but lowered the candle power of the gas. Figures as to gas production and lighting power were not given.

Gas from Peat and Wood.

The third question related to experiments in making gas from other materials than coal, and more especially from peat. As in the coming season a shortage of coal is to be feared, no means ought to be left untried to make gas from other material.

The first member to give his experience was the manager of the Sappemeer (Groningen) Gas-Works, almost in the centre of the peat districts. His first trials were with peat only; and these were a failure. He obtained, indeed, a satisfactory bulk of gas; but it had an insufficient candle power, and the calorific value was such that it could not be used in gas-cookers. The second series of experiments was with a mixture of coal and peat; and ultimately it was found that the best results were obtained when a mixture of 75 per cent. of coal and 25 per cent. lumps of peat was used in the retorts. Trials were also made with the use of a higher percentage of peat, in which case the peat was previously tarred. The gas was fairly good; but the retorts showed considerable incrustation.

The gas manager at Bedum (a small borough in the same district) had tried wood for the production of gas. The most favourable results had been secured when using four parts of gas coals and one part of pine wood. The gas was of good quality, and caused no complaints. He also tried peat for gas production, but was of opinion, too, that a mixture of coal and peat was really best for carbonization. Further, he had produced gas from old railway sleepers, getting good results; but when his stock was exhausted, he could not get any more.

Other experiments had been made with peat lumps soaked in kerosene, and afterwards watered to prevent flaming during retort charging. This mixture gave a gas of good quality, but of very low specific gravity. On an emergency, retorts had been filled with a mixture of peat and wood; and none of the consumers complained of the quality. All these experiments had been conducted in small works, where there were no adequate means of testing the gas, so that the conclusions were somewhat at random. But as the question is of very general importance—Holland having lots of peat—it has been resolved that experiments should be carried out in larger gas-works, with adequate experimental plant. For this purpose, peat is to be carbonized at The Hague Gas-Works in horizontal retorts, and at Amsterdam Zuider Gas-Works in vertical retorts.

Miscellaneous Matters.

Subsequently, the members resolved to prepare instructions for the piping of houses and the installation of gas appliances; a committee being appointed to draw them up.

On the following day, there was an animated discussion on the advisability of increasing gas prices under the present abnormal conditions. In this connection, it may be pointed out that Dutch gas-works are for the most part municipally owned, and that in normal times profits go to the relief of the rates. The advisability was pointed out of putting by reserve funds in good years to meet losses in bad times; and one speaker urged that, rather than increase the price of gas, it would be preferable to raise a loan to cover losses in this period, with the intention of paying the loan off out of profits on the return of normal times. The general opinion seemed to be that reserve funds for paying losses in bad years were necessary for all gas-works, but that in the present circumstances it was not advisable to raise a loan to keep the price of gas at a low level. It would be better to raise the price—more particularly as it was quite impossible to tell how long the war would last.

The next point discussed was whether it was advisable to promote the sales of gas by official advertisements, &c., issued by the Association. It was agreed that the promotion of gas sales was more especially a matter for each separate town, but that the Association could lay down general rules and instructions. The President recommended the formation of a new organization on the basis of the British Commercial Gas Association, and the German Gas Promotion Centre. A committee was appointed to go into the matter.

A communication by Heer Brender à Brandis, of The Hague Gas-Works, discussed whether the latest artificial fertilizers were able to damage the sale of sulphate of ammonia. The author gave a review of the various sorts of nitrogenous fertilizers that have come into the market the last few years. His opinion was that synthetic ammonia is the most to be feared.

At the end of the discussion, Heer van Rossum du Chattel, the General Manager of the Amsterdam Gas-Works, made some remarks concerning the Dutch Coal Reserves Company. As an article on this question has already appeared in the "Journal" [*ante*, p. 71] it is unnecessary to deal further with the subject here.

The President for next year is Heer van Niftrih, Director of the Imperial Continental Gas Association's works at Flushing. The meeting will be held in Amsterdam.

THE ECONOMIC UTILIZATION OF COAL.

Some Methods of Production of Cheap Power.

Mr. Walter F. Reid, a Past-President of the Society of Chemical Industry, in the course of a paper, entitled "Economic Utilization of Coal and the Production of Cheap Power," read the week before last at the annual meeting in Manchester, said that in the past they had drawn most lavishly upon their supplies of this important raw material—not only using it wastefully ourselves, but also exporting large quantities even to our keenest trade rivals. Voices had been raised in warning against too lavish a use of their valuable resources. A Royal Commission, after a long and thorough investigation, had come to the conclusion that our stores of mineral fuel would suffice for many generations to come. As to the increased cost of coal to manufacturers, part of the increase was doubtless due to the increased depth of mines and to the increasing cost of labour, in addition to Government restrictions and regulations which had been enforced. Many countries abroad possessed coal resources that had scarcely been touched; and they also possessed more abundant resources than ourselves. The stores of fuel available for mankind were enormous; and if they were uniformly distributed no nation would have any cause for anxiety. Recent events, had, however, shown that no nation could with safety depend upon its neighbours for the supply of any raw material. The total coal output in the whole world during 1913 was 1,363,878,110 tons. In 1909, it was 1,093,663,143 tons, which showed an increase during this period of about 25 per cent. Taking these figures as a basis, and assuming that Germany controlled one-half the coal output of France, as well as that of Belgium, then the coal output at the disposal of the Central Empires was 366,564,447, compared with 411,238,173 tons available for ourselves and our Allies. For the production of power alone the supply was ample; for in 1905 Dr. Beilby estimated the consumption for this purpose at 52 million tons. More than one-half of the coal used for the production of steam power was wasted. Even if they adopted the most economical steam plant available, this method of producing power was still wasteful compared with other methods of utilizing fuel that are now in practical use. Some ten years ago Dr. Beilby estimated that the 52 million tons used for power could be reduced to 11 millions by using gas. It would scarcely be disputed that the gas-engine was

theoretically a more efficient means of producing power from coal than the steam-engine; but difficulties in the case of large installations had limited the application of this power to smaller units. For large power stations, the steam-turbine still maintained its position, and had done much to check waste in fuel, so far as steam power was concerned.

Gas Power the Cheapest Form of Energy.

In the light of modern technical progress, he considered it did not appear necessary that the coal should be mined and brought to the surface at great expense. An enormous saving could be effected by extracting the coal from the face of the seam by mechanical means and converting it into gas in the mine. Power could be produced from the gas on the spot, and transmitted to any required distance by electricity. The electric current produced in this way might well compete with that derived from water power in a distant country. Even with coal mined in the usual way, gas power appeared to be the cheapest form of energy generally available in England. The value of the bye-products, and the inferior quality of the coal that could be used, did much to diminish the actual cost of the power.

Power from Peat and Waste Products.

Gas produced from other materials than coal had been successfully used as a source of power. Peat had completely supplanted coal for the last four years at an important factory at Portadown (Ireland), with a saving in cost of more than 50 per cent. Many plants for producing power from waste wood and other waste products had been erected and worked with profit to the manufacturers concerned, but these materials were not available in such quantities as to provide a general source of cheap power. However cheap the materials might be at the moment, when a demand for them arose the price increased. For this reason he did not include oil among cheap sources of power.

The Gas-Turbine.

Hitherto he had spoken of gas-engines of the reciprocating type; but the gas-turbine had now arrived and had come to stay. The difficulties arising from the action of the high temperature on the turbine blades were being surmounted.

Natural gas as a source of power possessed great importance in some countries; but the small occurrence of this useful product in England precluded its use on a commercial scale.

A Tribute to Mr. Carpenter.

The President-Elect of the Society (Mr. Charles Carpenter, D.Sc.) had introduced a method for eliminating almost the last traces of sulphur from gas distributed in our towns. The great reproach to the use of gas in cities was that the sulphur was still in the atmosphere. The chemist knew full well that the sulphur was more injurious than the soot; so that, as the result of Mr. Carpenter's discovery, they might possibly get pure air now. He hoped that the day was not far distant when, instead of destroying the coal by one operation, they would arrive at a means of separating the constituents before the coal was wholly destroyed. He himself had made many experiments with a view to this end.

DISCUSSION.

Professor William A. Bone said there was no doubt about the importance of the subject they were discussing, and he was glad it had been brought forward at the meeting, because they had heard so much about the national importance of coal-tar dyes. The question as to the economy that could be effected, for instance, in power production was perhaps at the moment primarily of the greatest importance; and he would like to put forward a suggestion to chemical manufacturers as to the advisability in all large factories (it would not be practicable, perhaps, in the small ones) of establishing a department for fuel control, quite apart from the ordinary chemical laboratory. In all cases where the scheme had been adopted, and economically carried out, the saving effected had been out of all proportion to the cost of the fuel controlled. For example: In a firm with which he had been connected for many years, where iron and steel were manufactured, they had, during the last five or six years, by the establishment of a very rigid fuel control—and they paid their specialist one of the highest of salaries—been able to smelt the iron from the ore, convert the pig into steel, finish the rolling of the steel, and turn it out in the form of girders or rails, using no more coal than they used through the coke-ovens for blast-furnaces. Of course, this was only possible in an iron and steel works where the fuel arrangements were under proper control. He was not very much in favour of Government intervention, or aid, as it was sometimes euphemistically called in connection with industry; but he thought attention might be drawn to the very valuable reports which were being issued from time to time by the United States Government Bureau in Washington with regard to a survey the Bureau were making as to American coals, and also with reference to the utilization of coal for different purposes. He thought a survey of British coals, from a chemical point of view, was a great necessity. Some people talked about coal as though every seam of coal was composed of a substance that was perfectly uniform. "Coal" was simply a wide name for a whole series of varieties. It would be very useful if the Society of Chemical Industry instigated some sort of systematic inquiry—an inquiry which might well be done through existing institutions and laboratories, each working in its own area, and supplying interesting information about coal in the particular neighbourhood.

Professor H. Louis (Newcastle-upon-Tyne) said coal was used for three purposes: (*a*) for generating power, (*b*) for heating, apart from power, and for (*c*) metallurgical and allied industries. He gathered from Mr. Reid's paper that his main thesis was that the gas-engine would replace the steam-engine. Personally, he had his doubts. He was inclined to think that for large industries, where great quantities of power were required, it was as cheap to generate electricity by steam as by gas, and for small industries he had no doubt that the development of large central power supplies would answer their difficulty to a very great extent. He believed that on the whole of the shipyards on the Tyne steam power had been replaced by electric power. The question of the use of gas *versus* steam was a very debatable point. He knew the danger of prophesying, but he thought the steam-engine would hold its own for many years to come. He thoroughly agreed with Mr. Reid that there was a great advantage when gas was made from inferior coal slack and various things of this kind; but unfortunately our collieries were not in a position to produce nothing but slack to-day. He considered that it was very wasteful to use our best coal for gas generation. There were certain qualities of coal which were best used for making gas, and there were other qualities which were better for burning in boilers. If they were to have real economy they must effect some improvement in both methods, for both systems went practically hand-in-hand nowadays. One could not supplement the other at all. With regard to Mr. Reid's observations on "power being produced from gas on the spot," the law to-day would not allow a gas-producer underground—in a mine. He wanted at one time to put a suction plant underground, but found it was entirely against the coal-mining regulations. With a gas-producer underground there was the risk of danger of carbonic oxide getting into the workings. Those who had had experience of the cost of working plant underground knew that it was very much more than on the surface. Plant could not be worked underground as economically as on the surface—it could not be given the fullest supervision.

The Sulphur Question.

Mr. Charles Carpenter, D.Sc., thought that the meeting was greatly indebted to two gentlemen for the interesting information which had been placed before them that morning—namely, Mr. Walter Reid for his very able paper, and Professor Henry Louis, whose remarks formed a most important addendum to it. It had long seemed to him that the State should take some part in the control of the important industry of coal mining, not only from the point of view of labour, but the disposal of what was, after all, the important part of the capital assets of the country. Professor Louis had given an example of how this might be wasted in the mines, and he (Mr. Carpenter) would like to point out that while we had to maintain an enormous Navy for the purpose of, among other things, protecting these coal resources, our enemies paid nothing by way of contributing to the cost. He had been told by those who ought to know—for they were associated with the production and sale of coal abroad—that there was no reason whatever why an export duty should not be placed upon coal. The price already being paid was more than the normal price of coal, even if a shilling or two duty were added, and, of course, had to be given, because it was indispensable. More especially was this true of certain kinds of English coal, such as the coking or smokeless varieties. He had been assured that the main objection to the levying of a duty on coal was lest it should be a fluctuating one, but that if a standard duty were fixed, to which buyers and sellers became accustomed year by year, the amount added by way of duty would be paid as a matter of course. Mr. Reid had referred to the work in which he (Mr. Carpenter) had been interested—the matter of reducing the sulphur compounds in gas; and it might be interesting to the meeting to know that they were now experimenting with the use of coal so impure that it ought not to be used for either gas making or burning in furnaces, although in the former case they had not such a special means of dealing with the sulphur as was now available. The inferior coal to which he had referred was being used, not with the object of producing gas, which was regarded as a bye-product, but in order to obtain sulphur for sulphuric acid making, for which, as everybody in the room was aware, there was a present great demand. He thought that if the uses of gas for industrial purposes were more widely known, its application would be very greatly extended, and mentioned the case of the heating of pots for chemical fusions, which required a minimum amount of supervision and control in the great regularity in heat provided by the combustion of gas.

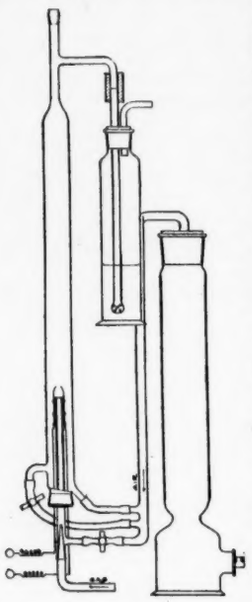
The Author's Thanks.

Mr. Reid, in thanking the members for their patience in hearing him, referred to the low-temperature distillation of coal. The products arising therefrom were exceedingly valuable. He hoped that in future they would not distil coal at all, but would find some other way of utilizing the product more economically. He agreed with Professor Louis that the use of steam for large installations was to be preferred—he said so in his paper—but from a theoretical point of view, there must always be a waste of a certain amount of heat, because the coal had to be converted into steam. Mr. Carpenter's remarks as to the new sources of sulphur in this country were most interesting. He had illustrated the excellent work done in extracting the sulphur from the coal gas that we were now using.

DETERMINATION OF SULPHUR IN GAS.

The United States Bureau of Standards (Washington, D.C.) has issued a "Bulletin" by Messrs. E. R. Weaver and J. D. Edwards, entitled "Apparatus for the Determination of Sulphur in Gas;" and the text of it appears in the current number of the "Journal of Industrial and Engineering Chemistry."

The authors write: The sulphur apparatus which is shown in the accompanying illustration is the same in principle as the well-known Drehschmidt apparatus and its many modifications; the gas being burned and the oxides of sulphur collected by passing the products of combustion through an alkaline absorbing solution. The novel features of the apparatus, as illustrated, are the burner and the combustion chamber.



The burner is similar to one described in a technological paper of the Bureau.* The method of igniting the gas and the arrangement of secondary air inlets, however, are different. The platinum spiral which was heated to incandescence in order to ignite the gas has been replaced in the new type of burner by a pair of platinum terminals forming a spark gap. The inconvenience caused by the occasional burning-out of the platinum wire is in this way avoided. The platinum terminals are sealed to the porcelain burner tube by means of "sealing-in" glass. Only a short length of platinum wire is necessary—nickel leads being soldered to the platinum terminals, just below the point where the latter are sealed to the porcelain tube. The stopper which closes the lower end of the combustion chamber also serves as a connector; the porcelain burner tube and the glass T-piece being firmly fastened into it by means of Khotinsky or sealing wax. The small tip through which the gas enters, just above the primary air inlet, is also held in with Khotinsky cement. The tip can be easily removed for cleaning, or tips of various sizes (adapted to the gas to be burned) can be inserted. The air necessary for complete combustion, after being purified by passing through the large soda lime tower, is supplied to the flame in two portions. The primary air is drawn in by the gas as it passes through the small tip, the secondary air enters through the two inlets at the side of the combustion chamber.

The combustion chamber, made of Jena glass tubing, is about 360 mm. long and about 25 mm. in internal diameter. The narrow tube at the top may be used for introducing water when it is desired to rinse out the apparatus; when in operation the tube is closed with a small cork. Satisfactory drainage is provided by the sloping layer of paraffin or sealing wax covering the stopper at the bottom. When the burner is lighted, the secondary inlet air keeps the base of the apparatus cool; but the rest of the combustion chamber up to the side tube is heated so that no condensation takes place on the walls. For this reason it is usually unnecessary to rinse out the combustion chamber. By means of a cork connector, the first of a series of wash-bottles is attached to the apparatus. Only one wash-bottle is shown in the illustration; but three are usually required for satisfactory operation. In order that the suction may pull the gas steadily through the wash-bottles, it is necessary that the end of the inlet tube of the first bottle be perforated with a number of small holes. With a single, large opening the operation of the burner is not steady.

Experience has shown that combustion of the sulphur to oxides is incomplete when the flame (because of too little primary air) is smoky or even strongly luminous without smoke, as well as when the supply of secondary air is not sufficient. This latter condition is shown by a flame with an indefinite or "ragged" outline. When the gas and air entering the burner are so regulated that the flame is non-luminous and clear-cut, combustion is complete, and the results obtained have been more concordant than those obtained with any other apparatus in use in this laboratory.

The advantages of the apparatus are its small cost, simplicity of construction, and the fact that the difficulty of lighting and regulating the burner usually experienced in the use of apparatus of this type is entirely overcome. The platinum wires become heated by the gas-flame and prevent the flame going out when the pressure fluctuates. With a single adjustment, it has been found possible to keep the flame burning with gases varying in composition from pure hydrogen to pure acetylene, and at pressures ranging from 2 to 10 inches of water. Of course, combustion was not complete with such extreme variations. It is, however, easy to adjust the apparatus to burn completely any gas which can be burned in any bunsen-type burner.

* "Determination of Sulphur in Illuminating Gas," by M'Bride and Weaver. See "JOURNAL," May 20 and 27, 1913, pp. 531, 598.

COMPOSITION OF GAS IN RELATION TO THE PERFORMANCE OF THE BUNSEN BURNER.

In giving, *in extenso*, an article by Mr. Robert F. Pierce, some extracts from which we publish below, the "American Gas Light Journal" remarked: "Very often the value of certain research work is not thoroughly appreciated until some other line of examination calls it to mind. The article by Mr. Pierce, in which he describes the results of some experiments on the performance of the bunsen burner with gases of differing calorific values, gives a different aspect to a good many things we were just beginning to accept as standard. It emphasizes particularly the value of flame temperature in gas utilization, and shows, more forcibly than most others have done, that this characteristic is not always affected by an increase in B.Th.U. value—the change being, of course, due to other constituents of the gas. Mr. Pierce's conclusion is a little startling when he says: 'As far as incandescent lighting is concerned, it does not make the least difference to the consumer whether he pays $1 per 1000 cubic feet for gas of 480 B.Th.U. or $1 a thousand for gas of 660 B.Th.U.' From his data 'it would appear that the incandescent gas-lamp adjusted for maximum incandescence tends to be essentially a constant consumption, constant light output apparatus, independent of changes of gas quality, calorific value, specific gravity, &c.'"

Mr. Pierce writes: About four years ago the author became impressed by the fact that gases entirely similar as regards the customary specifications of gas quality and conditions gave such widely differing results in the incandescent gas-lamp that it was practically impossible to obtain useful comparative data, except from lamps tested side by side upon the same day and at substantially the same hour. The series of tests undertaken with the object of determining, as far as possible, the nature and effects of the confusing and disturbing elements developed some facts that may be of interest in connection with the present discussion of standards of calorific value; and in view of this wider interest and the paucity of definite information on desirable specifications of gas quality, the writer feels justified in offering these data, however fragmentary, for consideration.

While the incandescent gas-lamp is admirably suited in some respects for an investigation of the performance of the bunsen burner, the results so obtained must be taken with due consideration of its limitations. The efficiency of the most important processes involving the uses of gaseous fuel is a function of flame temperature, and the higher the temperature involved in the process the more greatly is the efficiency influenced by the flame temperature. We are perhaps justified in assuming that the relations of flame temperature to efficiency in the incandescent gas-lamp and in other high temperature appliances—such as boilers, furnaces for the heat treatment of metals, metal-melting furnaces, &c.—are sufficiently similar to justify us in taking the relation in the former as at least an index of the relation in the latter group. In the case of bake-ovens, water-heaters, and appliances for processes involving comparatively low temperatures, the efficiency is favourably affected by increased flame temperature, but to a very much smaller degree than in high temperature operations.

It is much easier to obtain the total light output of an incandescent mantle than to measure the average temperature of a bunsen flame; and the results are of a higher degree of accuracy. The performance of gases in an incandescent gas-lamp, therefore, furnishes a convenient indication of their relative availability for other processes involving high temperatures.

In the test from which the results hereafter set forth were drawn, a No. 71 Welsbach upright burner, fitted with a No. 197 mantle ($3\frac{1}{2}$ in. by $1\frac{1}{8}$ in.) and straight (non-airhole) chimney, 8 in. long by 2 in. diameter, was lighted, adjusted for maximum incandescence, and the horizontal candle power measured daily from Aug. 3 to Nov. 21, 1911. It is assumed that during this period of intermittent burning no appreciable deterioration in mantle quality took place. The gas was tested daily for gross calorific value, specific gravity, and candle power (per 5 cubic feet per hour in the open-flame burner). The temperature and humidity of the air in the room were also ascertained. The gas used was carburetted water gas, and varied in calorific value between 463 and 666 B.Th.U. per cubic foot, between 15·2 and 24·6 candle power, and between ·562 and ·724 in specific gravity. The lamp, which was adjusted at each reading for maximum horizontal candle power, gave between 94·4 and 108·8 horizontal candle power on between 4·25 and 5·15 cubic feet per hour consumption. Atmospheric temperature varied between 60° and 84° Fahr., and the humidity between 2·02 and 8·3 litres of water vapour per cubic metre. The gas pressure was kept constant at 2·5 inches.

This test was planned with a view to demonstrating that calorific value, specific gravity, and gas candle power do not definitely specify a gas for commercial purposes. It appears quite obvious that two gases may be identical as regards these particular qualities, yet so entirely different in composition that the resulting flame temperatures will differ greatly. However, the contrary opinion has been so often expressed that it was considered desirable to demonstrate the fact that specifications of these qualities were valueless for conveying any definite idea of the usefulness of the gas to the consumer.

Table I. shows nine pairs of tests in which the greatest similarity in calorific value, specific gravity, and candle power of gas were

obtained—the horizontal candle power being corrected for atmospheric humidity by a method described later. It will be observed that there is no closer agreement of the results obtained with similar gases than between those from gases of entirely dissimilar specifications.

TABLE I.

No.	B.Th.U.	Specific Gravity.	Candle Power.	Cons.	Corrected Horizontal Candle Power.
3	522	·677	20·58	4·55	114·75
13	539	·659	20·46	4·58	116·50
20	542	·654	18·37	4·85	119·30
33	553	·651	18·36	4·64	117·40
21	541	·643	17·14	4·58	117·90
24	539	·653	17·37	4·73	115·50
28	541	·679	19·19	4·49	119·10
29	548	·671	19·29	4·55	116·80
31	604	·633	18·61	4 81	113·85
80	599	·627	18·53	4·48	114·76
32	593	·603	18·28	4·75	115·95
38	585	·609	18·54	4·79	117·50
58	600	·712	18·72	4·65	121·46
59	600	·724	18·39	4·64	118·67
62	610	·653	17·30	4·70	114·05
67	604	·640	17·44	4·46	115·80
64	603	·672	19·39	4·48	116·10
71	606	·685	19·42	4·39	115·50

For example, there is a difference of 2·4-candle power between tests 21 and 24, in which the gases differed by but ½ of 1 per cent. in calorific value, 1½ per cent. in specific gravity, and less than 1½ per cent. in gas candle power; while between tests 3 and 62, the difference in candle power is but 0·7, while that between the calorific value of the gases is nearly 17 per cent., and between gas candle powers nearly 19 per cent. It is quite obvious that specification of calorific value, specific gravity, and gas candle power can never be taken seriously as predetermining the performance of incandescent lighting appliances or comparative tests.

One frequently hears the opinion expressed that, in the ordinary course of manufacture of carburetted water gas, the gas candle power tends to vary, in a way, with the calorific value. In this connection, the following table may be of interest:—

TABLE II.

Test No.	Gas Candle Power.		Calorific Value.
2	24·46	..	567
63	15·70	..	592
82	16·30	..	614
60	18·40	..	654
41	20·40	..	450
61	16·32	..	602
56	20 99	..	612
53	16·74	..	612

These are not isolated and peculiar discrepancies, but typical They will not surprise the gas engineer, but will probably conflict with the existing opinions of many whose contact with the manufacturing department of the industry is but casual. [The connection between gas candle power and the luminosity and efficiency of the incandescent gas-lamp was strikingly shown in two curves. The influence of humidity appears quite consistent—within the limits encountered—if one assumes that the irregularities due to varying gas quality tend to counterbalance each other. A line drawn as closely as possible to the average point had the formula: $I = -2{\cdot}716\,h + 116{\cdot}364$.

Where I = horizontal candle power
h = absolute humidity in litres per cb m.

which may be taken as the "humidity characteristic" of this particular lamp on an average carburetted water gas.]

It will be recalled that Mr. Bond [see "Transactions" of the American Gas Institute for 1912—"JOURNAL," Jan. 21, 1913, p. 190] found that a similar lamp sustained a loss of 0·6 per cent. in candle power for each litre of water vapour per cubic metre, as against 2·716 in absolute candle power in the above formula. It is hardly possible to compare the two tests, as they were conducted under entirely different conditions. The effect of humidity was only a casual consideration in the test here reported, and the range of humidity was rather narrow. The writer has no theory to advance in explanation of the discrepancy, but suggests that consistent differences in gas quality might account for it. The gas with which Mr. Bond worked probably had a consistently higher hydrogen content than the gas used in this test; and it is conceivable that the result of the addition of water vapour to a flame already high in this constituent might be less marked than in a flame containing less water vapour as a product of combustion.

The most interesting data obtained from the test related to the effect of varying calorific value upon the thermal efficiency of the lamp—that is, the light output per B.Th.U. input. As one would expect, the duty in horizontal candle power per B.Th.U. decreased with increased calorific value; the increase in B.Th.U. input was mainly due to increased calorific value of the gas, as the consumption tended towards a constant figure.

The formula of the curve drawn as close as possible to the average values is:

$$D = -0{\cdot}00001375\,H + 0{\cdot}0752$$

When D = Duty in horizontal candle power per B.Th.U.
H = Total heat input per hour (calorific value of gas consumption).

It has been shown by St. Claire Deville [see "Transactions" of the American Gas Institute for 1911—"JOURNAL," Vol. XCIX., p. 574, *et seq.*] that the duty of an incandescent gas-lamp expressed in light output per B.Th.U. per hour input has a greater tendency toward a constant value with gases of varying quality than any other feature of lamp performance, provided the ratio between the gas and the primary air is so adjusted as to secure the maximum duty with each gas. Interesting as this may be from a scientific standpoint, and even from a practical standpoint where air under pressure is available, it has no practical bearing upon the atmospheric burner, for the primary air is limited by the entraining power of the injector. Since the proportion of air pressure (or "blast") burners in actual use is insignificant, it would appear that any discussion of the relative economy of different gases should be based upon the performance of the atmospheric burner. These results may therefore furnish a suitable starting-point for a discussion of the relative economy of various gases in high-temperature appliances. Their direct and specific application to the bearing of illumination requirements on the selection of practicable standards of gas service is obvious.

When giving a chart showing the variation in duty with the calorific value of the gas, the author remarks that, at first glance, the data do not seem sufficiently consistent to justify the drawing of a curve assumed to represent average conditions. It will be shown later, however, that these discrepancies are principally due to a variable outside the gas, and that, as far as the influence of gas quality is concerned, a curve having the formula:

$$D = -0{\cdot}0000692\,C + 0{\cdot}08275$$

Where D = duty in horizontal candle power per B.Th.U. per hour,
and C = calorific value of gas in B.Th.U. per cubic foot

represents, within narrow limits, the behaviour of the lamp under consideration with reference to changes in gas quality only.

The most interesting feature of the curve is the fact that the decrease in duty with increase in calorific value is exactly counterbalanced by the latter. For example, comparing gases of 480 and 660 B.Th.U. per cubic foot respectively, it is seen that while the duty expressed in horizontal candle power per B.Th.U. with the former (0·04555) is 37·5 per cent. greater than that with the latter (0·03312), the B.Th.U. per cubic foot in the latter (660) are 37·5 per cent. greater than in the former (480). Thus the cost per candle power hour of producing light in the incandescent burner is independent of the calorific value of the gas. Taking the two gases cited above, the costs per candle power with gas at $1 per 1000 cubic feet in each case are:

$$\frac{0{\cdot}001}{0{\cdot}04555 \times 480} = \$0{\cdot}0000458 \text{ and } \frac{0{\cdot}001}{0{\cdot}03312 \times 660} = \$0{\cdot}0000458.$$

In short, as far as incandescent lighting is concerned, it does not make the least difference to the customer whether he pays $1 per 1000 cubic feet for gas of 480 B.Th.U. or $1 per 1000 cubic feet for gas of 660 B.Th.U.

Incidentally, this furnishes one of the strongest inducements to the gas industry to expand the field of gas lighting. It is recognized by every competent gas engineer that a large proportion of the obstacles encountered in rendering good gas service to the consumer are directly due to the condensable hydrocarbons present in gases of high candle power or of high calorific value. In the case of gas lighting service, the preponderance of troubles due to condensable hydrocarbons is so overwhelming that all other causes appear insignificant. Since it has been shown that incandescent lighting customers gain nothing whatever from increases in calorific value, even at the same price, but on the contrary suffer an actual loss in the quality of service received, the existence of a large and well-established lighting business should furnish the most effective argument to Public Utility Commissions against imposing standards of calorific value that militate against the best and most economical service of the consumer. For at least 50 per cent. of the available gas business in the States, the calorific standard value would be as useless, meaningless, absurd, and ridiculous as the present candle-power standard.

From the data thus far presented it would appear that the incandescent gas-lamp, adjusted at all times for maximum incandescence, tends to be essentially a constant consumption, constant light output apparatus, independent of changes of gas quality, calorific value, specific gravity, &c. That such irregularities and discrepancies as occur are largely due to atmospheric humidity is shown by correcting the data for humidity according to the formula already given. Corrected to dry air conditions, all points lie sufficiently close to a line having the formula:

$$D = -0{\cdot}000018\,H + 0{\cdot}092$$

to justify the definite statement that, within the limits of the test, this formula represents a definite characteristic of the incandescent gas-lamp. The hypothesis that the gases of lower calorific value are comparatively poor in hydrogen, and may be expected to gain more by a humidity correction than those richer in hydrogen, is supported by a comparison of the writer's humidity correction factor for water gas with that of Bond for mixed coal and water gas.

The results of correcting the original candle power figures for humidity conclusively prove that within the conditions and limitations of the test the incandescent gas-lamp is essentially a constant candle power apparatus. The maximum candle power (121·46) is but 8·4 per cent. greater than the minimum (112·0) The mean (116·3) agrees closely with the result obtained by calculation from the formula:

$$I = -2{\cdot}716\,H + 116{\cdot}364$$

from which the value for dry air is 116·364.

One may therefore fix the standard rating of a No. 71 burner with a No. 197 mantle and No. 42 non-air-hole chimney on carburetted water gas and in dry air as follows:

Horizontal candle power. . .	116·3
Consumption	4·6
Humidity correction factor. .	−2·716 per litre per cb m.

The range of variation in consumption from the mean of the test (4·584) is somewhat disappointing, being from − 7·3 per cent. to + 12·1 per cent. While this variation apparently bears no definite variation to any of the qualities thus far considered, there appears to be some hope of devising a specification which shall narrow the range of effect of unknown variables to within much narrower limits. This will receive consideration in a future contribution. For the present we can say that neither gas candle power, specific gravity, nor calorific value is of the slightest value either in predetermining the performance of a lamp or in fixing standards of service for gas lighting.

It is particularly interesting to note the close agreement between deductions from the various formulæ, independently obtained; and in no case was a curve redrawn to agree more closely with other data, nor were any comparative calculations made before drawing the curves. In each case, they would represent purely an ocular estimate of the apparent optimum curve.

There are three values for horizontal candle power in dry air, obtained by three independent methods:

I.—The mean of the corrected candle powers as observed during the test, which is 116·3.

II.—The "dry air" candle power, as calculated from the formula

$$I = - 2{\cdot}716\ H + 116{\cdot}364$$

III.—The results of calculation from the formula $D = - 0{\cdot}000018\ H + 0{\cdot}092$ to obtain the average value of the horizontal candle power over the range of the test—from 2100 to 3000 B.Th.U. per hour heat input. The close agreement between I. and II. has been noted above. The calculation from III. follows.

$$D = \frac{I}{H} = - 0{\cdot}00008\ H + 0{\cdot}092$$

where D = Duty in horizontal candle power per B.Th.U. input per hour
H = B.Th.U. input per hour
I = Horizontal candle power (corrected for humidity)

$$\text{I av.} = \frac{- 0{\cdot}000018\ H^2 + 0{\cdot}092\ H}{3000}$$

$$\text{I av.} = \frac{\int_{H=2100}^{H=3000} \left[0{\cdot}000018\ H^2 + 0{\cdot}092\ H \right] dH}{3000 - 2100}$$

$$= \frac{\left[- 0{\cdot}00006\ H^3 + 0{\cdot}046\ H^2 \right]_{H=2100}^{H=3000}}{900}$$

$$= \frac{104706}{900} = 116{\cdot}34$$

Calculations of the above formula between H = 2100 and H = 3000 yield the following data:

H = 2100,	I = 113·8
H = 2555,	I = 117·5 = maximum value
H = 3000,	I = 114.

The statement that I is essentially a constant is, therefore, practically correct within the limits of the test. The formula expressing the value of I is, however, an equation of the second degree. Without hazarding any guesses as to the range over which the formula is valid, it may be said that such incomplete results as are available concerning the performance of this lamp on natural gas and on water gas indicate that the formula holds, at least approximately, considerably outside the limits of this test.

Unfortunately, the tests made were upon a type of unit that is not of particular commercial interest at the present time. As stated above, they were made nearly four years ago, and mainly for the purpose of confirming the writer's hypotheses. He did not consider at the time that work upon this subject would command sufficient interest to justify the labour of preparing the matter for publication, although the importance of the subject was obvious. Recent interest in the question of better service standards, however, makes it appear that the data may be useful in that connection.

The Charlottenburg Institute have been investigating as to how far hydrometers are of service in determining the ammonia in gas liquor. Other gases in solution were found to make the readings different, even where the true specific gravities of the liquor were the same. Chemical reactions also interfere with the readings. On the whole, instruments of the hydrometer class do not show the percentage of ammonia present; but for rough working purposes (as at the scrubbers) they give valuable comparative indications.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Briquette Making.

Sir,—I have read with much interest the abstract relating to the above in the "Journal" for June 29, and also your "Correspondence" column of July 13.

I notice that coke-breeze is mentioned as the basis of the briquette. My experience has been that there is no difficulty in burning coke-breeze over ⅜-inch in size, either as fuel for boilers or for other purposes, and as such the present market price is many shillings more than the 3s. per ton mentioned by your correspondent.

In gas-works where the grading of coke and breeze is carried to any extent, the difficulty arises with the dust—*i. e.*, material under ⅜-inch in size. Notwithstanding the fact that the calorific value of the coke dust is almost equal to that of the coke or breeze, its conversion into B.Th.U. is not an easy matter.

Some few years ago a briquette plant for coke dust was installed at these works, and is still in operation. Pitch is used as the binding material, and briquettes are made of varying size. I cannot, however, endorse that they compete so favourably with other fuels as mentioned in your correspondent's letter, owing to the density of the briquette when pressed, and the consequent difficulty in its rapid combustion, especially under boilers where steam has to be generated quickly.

To my mind, a better outlook for the coke dust would be its gasification in a separate producer, and the application of the producer gas for the heating of boilers, retort-settings, or other purposes.

W. Chaney, Engineer.

Saltley Gas-Works, Birmingham, July 23, 1915.

German Goods in Dutch Disguises.

Sir,—Having resided over twelve years among English people, I have gained such an absolute confidence in their sense of fairness that I trust you will also place me in a position to clear my firm of an unfair attack caused by an article (reproduced from the "Ironmonger") entitled "German Goods in Dutch Disguises," that appeared in the "Journal" for July 13.

I readily believe that you and your contemporary have been misinformed; and that inquiries made in Holland were not looked for in the proper quarter, but were apparently obtained from someone who had a good reason to cause us damage. If you had made inquiries from some well-known firms in our trade—say, Messrs. Peck and Co., or others who have known us for many years—you would have received quite a different version.

I was at least very much surprised to see that our firm is not known in this country; while I dare say, without boasting, that we have been one of the very foremost firms in the lighting branch for at least twenty-five years.

The original founder, Mr. C. Gautzsch, who died some years ago, converted his business into a limited Dutch Company in 1905—*vide* the Government Gazette: Royal Resolution of April 15, 1905. I can further emphatically state that the young Mr. Gautzsch mentioned in your article is not the proprietor of our business, neither does he hold any interest in it. He is not in our service either, and has therefore no reason whatever for visiting us, even if he could do so.

If your informant had taken the trouble to go into the matter more closely, he would have found that our firm was one of the first to make incandescent gas-mantles in this country as far back as 1896—in their factory, Leliegracht, 25. When, however, the German manufacturers appeared on this market, with cut-down prices, we had to give way. Who can blame us that we grasped the present opportunity to reconquer part of the trade since Germany has had to stand back?

Regarding our capital, I beg to state that, except five shares which are in German hands, all our shares are placed in Holland and are still in possession of Dutch people. An official list of shareholders was submitted to, and approved by, the Home Office some time ago.

I finally beg to state that anyone with any knowledge of the business will readily admit that this modern factory, completely fitted up according to the latest principles, and in which over a hundred Dutch girls earn their daily bread, was not merely put up to serve during the war. We therefore trust that we shall be able to keep same going after the conclusion of the war.

J. Engel, Managing-Director,
Amsterdamsche Gloeikousjesfabriek.

Amsterdam, July 17, 1915.

[We are pleased to publish Heer Engel's explanation regarding the statements published by the "Ironmonger," which (we made abundantly clear on July 13) was the source of our information. We shall now be interested to learn the nature of the reply that will be made by our contemporary.—Ed. J.G.L.]

Munitions Meeting at the Davis Gas-Stove Works.—On Monday of last week, a highly successful meeting was held, under the auspices of the Munitions Parliamentary Committee, at the Luton works of the Davis Gas-Stove Company, Limited. The object of the gathering, which was attended by the Mayor of Luton and the Secretary of the local Recruiting Committee, was "to help, thank, and encourage the workers" of the Company who are now engaged in making munitions of war. Mr. H. N. Davis (Joint-Managing Director of the Company) occupied the chair, and in a few well-chosen words introduced to the meeting Mr. Tom Wing, M.P., the special representative of the Munitions Committee, who addressed the workers in a characteristic and impressive speech, which was heartily applauded by all present. Appropriate reference was made during the meeting to the fact that over 500 of the Company's regular workers are at present absent on military service.

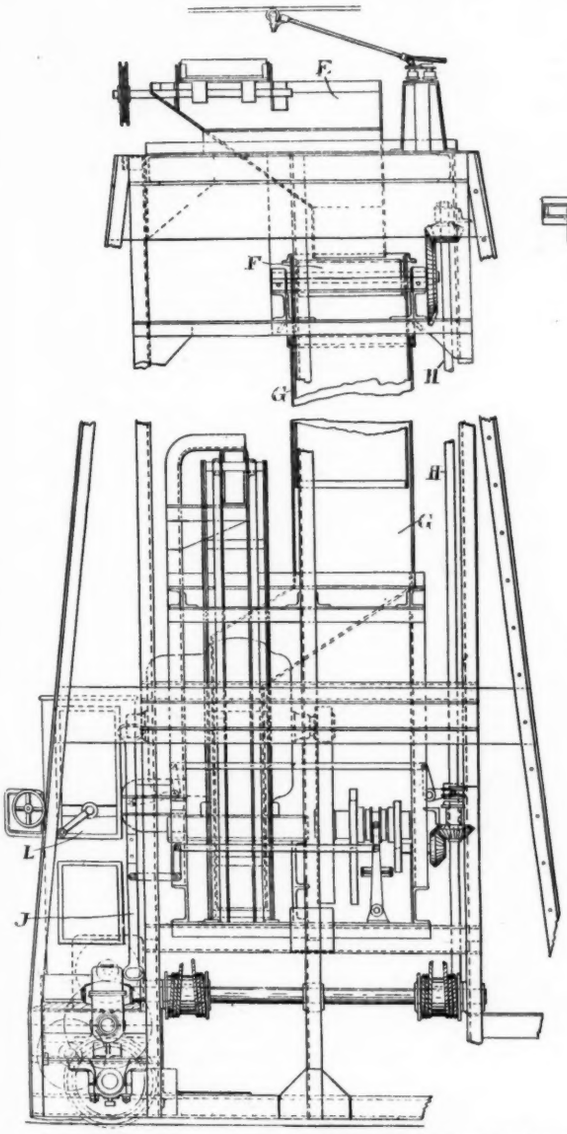
REGISTER OF PATENTS.

Charging and Discharging Gas-Retorts.

TOOGOOD, H. J., and ROBERT DEMPSTER AND SONS, LIMITED, of Elland.

No. 17,117; July 20, 1914.

In their specification, the patentees remark: In machine stoking of horizontal retorts, as at present practised, certain difficulties arise, which it is the object of this invention to overcome. For example, where a charging machine and a discharging machine are mounted on one framework, it is necessary, after discharging a retort, to traverse the machine so as to bring the charging machine in line with the particular retort. Thus time, labour, and power are lost—a serious consideration when taking into account that meanwhile the retort doors



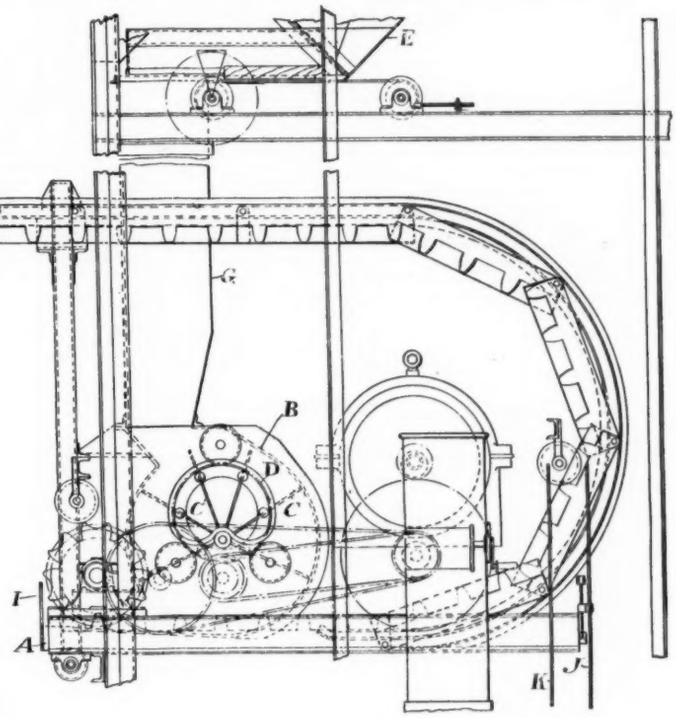
Toogood's (R. Dempster and Sons') Retort Charger and Discharger.

are open and valuable heat is escaping. To overcome this difficulty, machines have been designed to simultaneously discharge and charge a retort at one stroke—that is, the pusher discharging ram, while discharging, conveys the charge of coal into the retort, or guides therein during its withdrawal a projected charge, and on returning leaves the coal lying on the floor of the retort. This, however, introduces a difficulty, inasmuch as in many shapes of existing retorts the resulting charge is not found to be sufficiently heavy to suit the modern needs of gas manufacture.

According to this invention, these difficulties are to be overcome by entirely withdrawing the discharging ram from the retort before a fresh charge is introduced; the charging machine, which is of the projector type, being arranged between the side cheeks of the pusher ram, and the ram-head being hinged or provided with an aperture to permit the projection of the charge of coal through or past the ram-head. Should a packed charge be required, the pusher-discharger may be used as a ram-rod to pack the projected charge as tightly as desired—still without moving the machine. Where the ram is in the form of a number of segments hinged together, they are hinged at their outermost points, so as to enable the knuckle joints to pass beneath the charger. "The two machines being thus grouped on one axis, the whole apparatus will occupy a very limited length of retort-house extending beyond the retort-bench."

The illustrations represent a rear elevation of the machine and a side elevation (omitting the travelling carriage and hoisting gear, with which the present invention is not concerned, and which may be of any suitable construction). The travelling carriage, the framework of the machine generally, the motor by which the wheels are actuated for traversing the carriage, the hoisting gear, the motor which imparts the required movements to the feed conveyor, the ram or pusher A, and charger B, are all of the type described in patent No. 6882 of 1904, wherein shovels or plates C are rotated at accelerating or variable speeds by an eccentrically placed drum D.

The coal is supplied from overhead bunkers to the hopper E, and thence to the feed conveyor F, which, when running, delivers the coal at a rate proportionate to the speed of the machine, through the telescopic shoot G into the charger. The feed conveyor is driven by



a bevel pinion on a vertical shaft H. The hinged or sliding ram-head I is preferably provided with an aperture through which the charge of coal is shot—the passage through the aperture of a small quantity of hot coke when discharging being immaterial.

The action of the apparatus is as follows: The ram A being brought opposite the retort mouth, and the retort door being open, the handle J is operated to engage the clutch, whereby the ram is caused to advance into the retort and push out the spent charge. The motor is then reversed to withdraw the ram, and the handle thrown over to cause the engagement of the clutch. The charger is thus set in motion; and when the desired speed is attained, the handle K is operated to engage the clutch which starts the feed conveyor F, whereby coal is supplied to the charger and thence to the retort. As the charging proceeds, the speed of the charger can be reduced by operating the controller L; and after reversing the handle K and bringing the handle J to its median position, so as to stop the action, the motor can be employed to bring the machine opposite another retort.

Operating Centre-Valves.

R. & J. DEMPSTER, LIMITED, BEARD, G. F. H., and SCOTT, J. W., of Manchester.

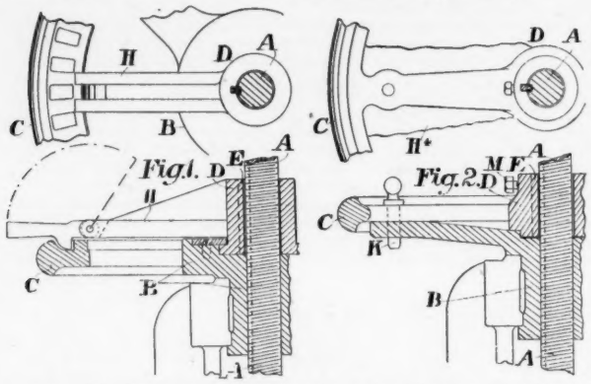
No. 5812; April 19, 1915.

This invention relates to mechanism for operating disc-valves by screw-and-nut action—as in Weck's centre-valve for purifiers.

It is common knowledge, the patentees state, that in course of time such a valve becomes more or less affected by the accumulation of material from the gas and otherwise, at the contact faces, "making it desirable that such material should be removed or the faces ground by friction clear of the same."

In order that their invention may be understood more easily, they mention that they have used a method of attaining the same object by providing a lever in connection with the nut within which the disc-valve screw worked, and whereby, when desired, the hand-wheel for turning the screw could be turned at the same time as the nut itself was turned by the lever—thus causing the disc valve to rotate instead of rising and falling as in ordinary working, and with the result that the face of the valve could be ground against its seating for the object in view. Continued use of the method described showed that there was an inconvenience in the fact that it was not always possible to turn the hand-wheel of the screw with the one hand, to the same extent as the move-

ment of the nut through the lever operated by the other hand—added to which the lever was always at a fixed level; while the level of the hand wheel varied with the level of the disc valve operated by it.



Beard and Scott's (R. & J. Dempster's) Valve-Operating Mechanism.

Fig. 1 is a portion of a plan and a sectional elevation of one form of the invention applied to the screw in connection with a single or double face disc-valve (not shown), situated within a centre valve. Fig. 2 shows similar views of another form. A is the screw in connection with the disc valve referred to; and B is the nut within which it works. With reference to fig. 2, the hand wheel C, for operating the screw, is attached to the nut, instead of being attached to the screw itself as in the earlier device, and this nut is capable of rotation in its bearings. The screw passes through a collar-piece D, which piece is provided with a feather E (indicated by broken lines), which passes within a key-way formed along the length of the screw. Projecting from D is an attached arm H, having pivoted to it a handle formed with a nose-piece or tooth capable of engaging gaps formed about the outer extremity of the wheel C.

When the handle is raised, as indicated by broken lines, the wheel C is free to turn independently, and the turning will result in the screw A being raised or lowered as desired in the ordinary manner of working. But when the handle is lowered so as to engage one of the gaps or slots in the hand wheel, the turning of it will result in the screw being rotated through the connection or feather E of the piece D. In the disengaged position the nut B and the piece D may be moved independently of each other (in the direction of rotation). In this way the disc valve connected to the screw may be brought to its seating as near as possible, and then be rotated for cleaning purposes. The number of gaps in the wheel C enable the engaging of the parts referred to to be varied according to the position of the valve relative to its seating. The lever arm H and the wheel C are always close together, and the connection between them is a positive one.

With reference to fig. 2, the hand wheel C is attached to the collar piece D; while a disc I is the equivalent of a lever, but is attached to the nut B. A pin K connects the wheel and disc together, and it may be connected by chain or cord to the stud M.

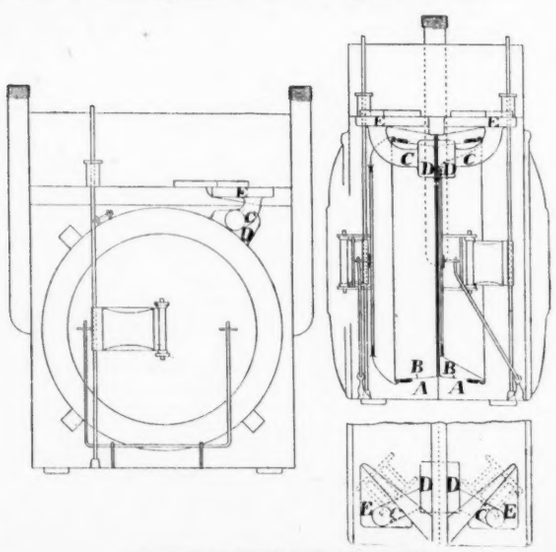
In this example, the pin is capable of passing through a hole in one or more arms of the wheel C, and into one of a number of holes round the circle in the disc. When the parts are disengaged, the turning of the wheel C causes the screw A to turn in the nut B—the latter acting as a fixed nut.

Dry Gas-Meters.

TURNBULL, J. W., and FOSTER, J., of Birmingham.

No. 7728; Sept. 25, 1914.

This invention relates to the dry gas-meters of the type wherein (as patent No. 5029 of 1896) a passage with a right-angle bend is provided between the measuring chamber and a valve grid or the like.



Turnbull and Foster's Dry Gas-Meter.

A front elevation of the meter (with the front removed), a side elevation (one diaphragm being shown inflated, the other deflated), and a plan are given.

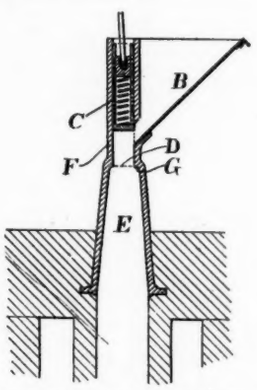
The two measuring chambers A are separated, as usual, by a partition, to the opposite sides of which are attached, by projecting lugs, two shallow circular dishes B, to which diaphragms are secured. To each of the diaphragm dishes is fixed a right-angle bend C, one end of which is fastened to an expansion chamber D communicating with the diaphragm chamber, and the other end to the usual breeches member E beneath the valve grid. By the use of the chamber D in the form illustrated there is provided "a very easy or free-way conduit between the valve grid and the diaphragm chamber, effectually avoiding narrow passages such as absorb pressure by resisting the gas flow."

Retorts or Ovens for Carbonizing Coal.

SLOCUM, F. L., of Pittsburg, U.S.A.

No. 18,215; Aug. 1, 1914.

In carbonizing coal under pressure applied to the charge in the retort or oven by forcing fresh coal into the retort, the patentee points out that it is impossible to avoid relieving the pressure periodically while the fresh coal is fed between the charge and the ram which exerts the necessary force. During the relief of the pressure the semi-carbonized, plastic coal in the retort is apt to expand, and, carbonization continuing, to lose its plasticity before the pressure is again applied, which is detrimental to the density of the coke produced. He therefore proposes to provide means within the retort (or within an extension) constituting a charging shoot or chamber, for preventing the outward movement of the charge when the pressure applied by the ram is relieved, and thus preventing expansion.



Slocum's Vertical Retort Charger.

Suitable means consists in a constriction or shoulder within the retort (or extension) above the zone in the former in which the coal first becomes plastic. Preferably the extension is provided with a shoulder just below the limit of the inward stroke of the ram, as illustrated.

The coal descends from the hopper B, while the ram C is in the position shown, to fill the extension E and shoot F. The downward stroke of the ram terminates at the dotted line D; and at this level the extension E is formed with a shoulder G. The extension being full of coal, the latter is prevented by the shoulder from appreciable upward movement when the ram is raised. "Hence expansion of the plastic semi-carbonized coal in the upper part of the retort is reduced to a minimum."

APPLICATIONS FOR LETTERS PATENT.

10,157.—WADE, H., "Regenerative furnaces." A communication from the Empire Machine Company. July 12.

10,196.—GRAY, J. R., and ALDER AND MACKAY, "Dry gas-meters." July 13.

10,207.—PINET, A., and DEBOUT, A., "Manufacture of gas." July 13.

10,244.—DUCKHAM, A. M·D., "Removing dust from gases." July 14.

10,250.—DEUTSCH-LUXEMBURGISCHE BERGWERKS UND HÜTTEN-AKT.-GES., "Ignition of gas burners under water." July 14.

10,265.—DEAN, W. T., "Diffusion and distribution of light." July 14.

10,285.—ROGERS, R. J., and CADWALLADER, W. E., "Gas-fires." July 15.

10,293.—LEECH, W. J. B., and PAYNE, C. R., "Hydraulic mains." July 15.

10,294.—GRAFTON, W., "Burners for gas fires." July 15.

10,295.—GRAFTON, W., "Taps for gas-fires." July 15.

10,321.—BEINDL, C., "Production of hydrocyanic acid and cyanides." July 15.

10,333.—BROWN, W. H., "Gas-stoves." July 15.

10,405.—FLETCHER, RUSSELL, AND CO., LIMITED, and BANKS, W., "Gas-heated hand-irons." July 17.

Lurgan Gas Purchase.—The Lurgan Urban Council have decided to apply to the Treasury for sanction to the borrowing of £47,000 to meet the cost of purchase, under the Act of Parliament recently passed, of the works of the Lurgan Gaslight and Chemical Company. The date of transfer is to be Oct. 1.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bill read the third time and passed: Glasgow Corporation.

The Barnoldswick Water Bill and the Southend Water Bill were returned from the Commons, with amendments, agreed to.

The Dewsbury Corporation Bill, Gas and Water Provisional Orders Bills (Nos. 1, 2, and 3), Lincoln Corporation Bill, Metropolitan Water Board Bill, Rhondda Urban District Council Bill, and the Weardale and Consett Water Bill were read the third time, with amendments, passed, and returned to the Commons.

The Port-Glasgow Gas Bill [Lords] was returned from the Commons agreed to.

The Ashington District Council Bill [Lords] and the Wolverhampton Water Bill were returned from the Commons agreed to, with amendments, which were considered and passed.

The Commons amendments to the Plymouth Corporation Bill [Lords] and the South Staffordshire Water Bill [Lords] were considered and agreed to.

A petition against the Plymouth Corporation Bill has been presented by Mr. Stanley T. Pitts.

HOUSE OF COMMONS.

The following further progress has been made with Bills:—

Bills read the third time and passed, with amendments: Ashington District Council, Plymouth Corporation, Port-Glasgow Gas (without amendment), South Staffordshire Water, Wolverhampton Water.

The Lords' amendments to the Lincoln Corporation Bill were considered last Friday and agreed to.

The House was informed that the Glasgow Corporation Order Confirmation Bill, Rhondda District Council Bill, Weardale and Consett Water Bill, Dewsbury Corporation Bill, Metropolitan Water Board Bill, and Gas and Water Provisional Orders Bills (Nos. 1, 2, and 3), had been agreed to by the Lords; and also the amendments to the Ashington District Council Bill and Wolverhampton Water Bill.

The first report of the Departmental Committee appointed by the Secretary of State for the Home Department to inquire and report as to the conditions necessary for the adequate lighting of factories and workshops has been presented to both Houses and ordered to lie on the Table.

The Supply of Toluene.

In the House of Commons on Wednesday of last week,

Mr. TOUCHE asked the Under-Secretary of State for War if he was aware that collieries producing toluene for Government purposes were handicapped by the manner in which their men were taken away by the recruiting officer; and would he endeavour to secure a better co-ordination of plans between the officials whose business it is to enlist men employed at collieries and those who are pressing colliery owners for products urgently required for munitions, the output of which was being restricted by recruiting.

Mr. TENNANT, in reply, said: The question of the limitation of the enlistment of coal miners is engaging the careful attention of the Secretary of State in conjunction with the Home Office.

Westphalian Coal Syndicate.

The following question was replied to in the House last Thursday.

Mr. MONTAGUE BARLOW asked the President of the Board of Trade whether Herr Hugo Stinnes, the representative of the German coal monopoly known as the Westphalian Coal Syndicate, has within the last few years conducted large operations for the purchase of Welsh coal in Cardiff and Swansea; and whether he has purchased, or has acquired interests in, any coal mines in Wales or other parts of the country.

Mr. RUNCIMAN replied that large purchases of coal were made in Cardiff and Swansea during the last few years by Hugo Stinnes, Limited—a company in which all the shares were held by Mr. Hugo Stinnes. On the application of the Board of Trade, the Court appointed a Controller of the Company in December last, and the Company's operations have recently been limited to realizing certain of its assets and discharging the debts owing by the Company in this country. He had no information that interests in coal mines in Wales had been acquired by Mr. Stinnes; but 48½ per cent. of the issued capital of the Northern Union Mining Company, Limited, was registered in the names of Mr. Stinnes and Hugo Stinnes, Limited, a further 48½ per cent. of the issued capital being held by a German company. The Northern Union Mining Company, Limited, had acquired extensive coal mining leases in Yorkshire and Nottinghamshire, and a supervisor of the business was appointed last December.

The Budleigh Salterton Urban District Council have appointed a Sub-Committee to meet the Directors of the local Gas Company respecting the public lighting of the town, which is now entirely suspended. The police are prepared to sanction 52 of the lamps being lighted, so long as they are not visible from the sea front. Meanwhile, the Gas Company have sent in their quarterly account to the Council, with the promise of a rebate.

PRICE OF COAL (LIMITATION) BILL.

THE DEBATE ON THE SECOND READING.

Monday, July 19.

The Bill to provide for the limitation of the price of coal, presented by Mr. Runciman, the terms of which were given on p. 137 of the "JOURNAL," was ordered for second reading on Monday of last week.

Sir JOSEPH WALTON, in moving, as an amendment, that the Bill be read a second time "upon this day three months," said he wished it to be clearly understood that he would not allow either coalowners or any others engaged in any trade or business to enrich themselves by the retention of war profits. Any legislative proposal to prevent this on broad and equitable lines would have had his strongest support; but he condemned this Bill on the ground that it penalized one great industry only, and left others making huge war profits to go scot free. Though the Bill might be regarded as of a temporary character, it was difficult to retrace a step of this sort if once taken. To say the least, the Bill was an alarming interference with the hitherto free right to contract; and it was a violation of the principle of Free Trade. The policy of having a maximum price fixed by the State, if adopted at all, must be applied equally in all trades and industries affected by the war. The colliery owners were prepared to make great sacrifices for their country. They made little protest when the Government commandeered practically the whole of the steamers which had been legally chartered to convey coal to London at 3s. per ton. In his opinion, this did not justify the Government in charging for interned German steamers performing the same service 13s. 6d. per ton, when they were allocated to replace the steamers which the Government had taken. The partial prohibition of exports had already forced down the price of coal many shillings a ton; and markets were being lost which it would be difficult to regain. Having no outward cargoes of coal raised the cost of freight, and consequently the prices of meat, wheat, and other necessaries of life to the consumers in this country. There was a widespread idea that all coalowners had made colossal profits since the outbreak of war. This was certainly not true so far as regarded the majority of the collieries in the districts he knew best. The average price realized for Durham coal, as ascertained by the auditors of both the men and the masters, in the first quarter of 1915, as compared with the first quarter of 1914, actually showed a reduction of 5d. per ton. A great deal had been heard from gas companies and railway companies about coal prices. With regard to the former, the greatest exaggeration prevailed. For instance, the great gas companies of London were receiving to-day, and would receive for months to come, large quantities of coal at less than cost price. If the State now intervened and arbitrarily fixed the price that the coalowners were to be allowed to charge the gas companies, preventing them from recouping the loss—the heavy loss, in many cases—that the owners were at present sustaining, and at the same time left the gas companies free to charge, as they were doing, more than twice the price for gas coke and to exact from the Government enormous prices for toluol and other residual products, this was a one-sided and unfair arrangement. There was no doubt whatever that the idea contemplated in the Bill of fixing a pit-head price and then apparently leaving the merchant free to exploit the consumer to his heart's content, was one that was absolutely indefensible. As to the provisions, he could not congratulate the President of the Board of Trade on the clearness of the drafting. There were many contracts for coal still running which were made before the war at prices substantially below the present cost price. His belief was that the most unfortunate and lamentable stoppage in South Wales would have been averted, as would many other labour difficulties, had the Government boldly declared months ago that the increased profits of coalowners and of all other traders, manufacturers, and taxpayers during the war would be taken as a War Tax into the Treasury. If he were not successful in securing the rejection of the Bill on its second reading, and if the House would not sanction the taxing of the whole nation through its coal supply, he would suggest that the Bill be limited to fixing the prices householders should pay for coal for domestic purposes—not the pit price, but what they paid when they received the coal into their cellars – omitting altogether any attempt to fix a price for manufacturing and other purposes.

Sir RICHARD COOPER seconded the amendment, and urged that, if anyone had been bleeding the public in the price of coal, it was the merchants and dealers far more than the coalowners.

Mr. RUNCIMAN said the object the Government had in introducing the measure was to deal with the price of coal at its source; for the simple reason that the price to the retailer must invariably be affected by the price of coal at the pit-head. A shilling rise in the price of coal used within these shores, represented no less than £9,000,000; and whatever the average rise was over the country as a whole, there was no doubt the increased cost of coal over the whole year must have represented somewhere about £20,000,000. It would be unfair to limit the Bill only to household coal. Looking at all the figures, it would be seen that the output of coal had gone down less rapidly than the enlistment of men had gone up. Large numbers of contracts had already been made, some at only 2s. 6d. or 3s. above last year's prices, and some a good deal more. Nearly all the large consumers bought direct from the coalowners; and there was no doubt that the coalowner controlled the price of coal. Taking the country as a whole, so far as he could ascertain, the extra cost of giving the war bonus grant to the men would not be below 9d. or over 1s. per ton. There had also been other advances in wages which would add to the cost of getting coal. When all the extra costs were added together, the total amount by which the expense of getting the coal had been increased was something over 3s. a ton. Therefore 4s. was inserted in the Bill as being fair to both sides. He did not think the House could reasonably insist upon existing contracts being disturbed by the Bill. He had to confess that they had not been able to devise any means by which they could reasonably get hold of the middleman's profit, except that of taxation. The members of the London Coal Exchange had, however, given him an undertaking that the charge for coal was not to exceed by more than a certain number of shillings the price delivered to depôts in

London, this summer and in the coming winter. Those whom he had consulted had been strongly of opinion that the price of export coal should not be limited.

Mr. Russell Rea, in the course of a speech dealing with the work of the Coal Exports Committee, of which he is Chairman, denied that the action of the Committee had caused collieries to stop for want of orders from foreign countries. There were districts which were dependent upon the export trade for their working; and they had lost their largest customers. To all the collieries which were left open to the operations of the Committee, they had been most indulgent. They had given them every licence for which they had applied, except in cases where the shipper or consignee was a black-listed person or an alien enemy, or a suspected person. They had gone further than this, and refused to licence shipments from districts where they were able to dispose of their coal at home, and where they were not dependent upon the export trade. As showing the urgency of the question the Committee had to consider, he pointed out that, when they began their operations, public utility companies found their stocks growing dangerously low. He believed at one period the South Metropolitan Gas Company were within eleven days of stoppage. The London Gas Companies, and all the companies engaged in works of public utility, were extremely alarmed and in very considerable danger two or three months ago; and they set themselves to work under an organization to accumulate stocks in the summer. They calculated that they must get, not only a supply equal to their weekly consumption, but also at least 25,000 tons a week in addition, in order to face the winter. He was happy to say that, during the last two months or more, they had succeeded in putting by, not only the 25,000 tons a week which they required, but about 150,000 tons beyond this. So that, on the whole, the situation was not so bad as they feared it might become a few months ago, when the Coal Exports Committee was appointed. The production of coal, when one considered the number of men who had left the collieries and gone to the front—and these were the best men—had been extremely satisfactory. The amount produced per man had actually gone up, though they had had in the collieries much less experienced men.

Mr. Walsh, while agreeing that there was a general wish that the object the Bill had in view might be accomplished, remarked that how anyone could be induced to believe that the dominant factor in the selling price was the pit-head price, and that once this was fixed at a reasonable figure all other things would practically accommodate themselves thereto, passed his comprehension.

Mr. Lawrence Hardy remarked that, though he had no actual right to speak on behalf of the mine owners, he believed that large numbers did not agree with the action taken by Sir Joseph Walton in moving the rejection of the Bill. One thing which undoubtedly the mine owners did feel very strongly was that they should have been picked out as the only persons to whom such drastic legislation should apply; while they were firmly convinced that the very high prices to which objection had been raised were due much more to the action of others than of themselves.

Sir Edwin Cornwall, rising to support the principle of the Bill, said that the London market for coal, as was the case with everything else, was subject to the keenest competition there could possibly be. In his opinion, the Bill ought to apply to contracts; but it should not be retrospective from the point of view of any coal delivered. It should apply to contracts from the date of the passing of the Act. It must be borne in mind that 80 per cent. of the coal produced in the country had already been sold under contract; and if the measure did not apply to contracts, they would be passing a Bill which dealt with a very limited supply of coal.

Mr. John O'Connor appealed for separate treatment for the few small collieries which he pointed out exist in Ireland.

Mr. Dickinson suggested that, if it was impossible to adopt the plan of actually fixing the price at which the coal was to be sold to anybody in London, there might be a better method of distribution. Again, he could not help thinking that the insertion of the clause in the Bill that it was not to affect any contracts would rob it of nine-tenths of its value.

Sir A. Markham said the Bill was the result of a proposal he made to the Government last January; but as now presented to the House it was absolutely worthless so far as the general consumer in the country was concerned. If the Government had, in the first place, made a definite pronouncement that all surplus profits over and above the average of the two or three years before the war would be taken by the State, there would have been no strike in South Wales. The Government had failed to take any steps whatever to let the people who were making these profits know that they ought not to make them. It was perfect nonsense to say that the price of coal had risen by anything like 3s. a ton on the average of the collieries of the country. If the amount was split in two, one would be getting nearer the truth. But under the Bill they were going to invite the colliery owners to take an increased price of 4s. per ton. The cost of delivering coal had very largely increased—something like 1s. 6d. or 2s. a ton, he thought, in London. Surely a clause could be drafted to "rope in" the middleman, once the main principle was agreed that the coal merchant was to charge no higher price than before the war. He intended to move in Committee that all contracts entered into for deliveries from and after the passing of the Act should be set aside. He would also move that the collieries should send to the Board of Trade the average prices they had received for the different classes of coal in the twelve months preceding the war; and to these prices he presumed the 4s. would be added. Unless the alterations he suggested were made in the Bill, the country would next year "still be fleeced and robbed at every turn by the middlemen."

Sir J. Harmood-Banner asked whether the suggestion was that contracts which were bad for the collieries should be broken as well as the good ones.

Sir A. Markham replied that his contention was that every contract should be cancelled which was in excess of the terms provided for under the Bill.

Sir J. Harmood-Banner (continuing) said he was a member of the Federated Coalowners; and while he could not state that they welcomed the Bill, they were quite prepared to fall in with it and do their best to carry it out.

Sir Joseph Walton remarked that if the President of the Board of Trade had made his speech before he (Sir Joseph) spoke, it would have modified his attitude on the Bill. In the hope that it might be amended in committee, he begged leave to withdraw his motton.

Mr. Pretyman (replying on the debate, in the absence of Mr. Runciman) said many of the criticisms which had been directed against the Bill would be unanswerable if it were a peace measure, and if it were a precedent which would lead them in this or that direction. But nothing done in war was a precedent for what would be done in peace. He suggested that if they could succeed by the Bill in establishing a basis price at the pit-mouth, they were going to have the minimum disturbance of industry. To go back on contracts would create many cases of inequality and hardship in the distributing trade.

Sir A. Mond pointed out that, though the Bill limited the price of coal, there was nothing in it which compelled anybody either to raise any coal or sell any coal. He could not see why it would be unfair to cancel contracts made (say) within the last three months.

Mr. Outhwaite said that within the past three weeks contracts at very high prices had been made; and he could not see why they should be respected.

The Bill was then read a second time, and committed to a Committee of the whole House.

THE BILL IN COMMITTEE.

Thursday, July 22.

When the Bill was in Committee later in the week, the various provisions which are contained in it were discussed at great length. A number of amendments were moved, some of which were negatived, while others were withdrawn.

One of these amendments was that the standard amount of 4s. mentioned in clause 1. (sub-section 2) of the Bill should be altered to 3s. The Committee divided on this, with the result that it was agreed, by 77 votes to 33, that 4s. should stand part of the clause.

The Question of Contracts.

Mr. Goldstone moved, at the end of sub-section 2, to insert:

"(3) In every contract for the sale of coal at the pit's mouth under which such coal has been sold but not delivered at the time of the passing of this Act, it shall be an implied term that the price of such coal shall not exceed the lawful price as determined by this Act; and any disputes arising therefrom shall be submitted to the Board of Trade for determination, in accordance with the Board of Trade Arbitrations, &c., Act, 1874."

He thought that this amendment was probably the one of most consequence. Without it the Bill, from the point of view of the household consumer and from the point of view of authorities who had large gas and electricity works, would be valueless. If the Board of Trade, at the outbreak of the war, had accepted responsibility for the coal mines as they did for the railways, a good many present-day difficulties would not have arisen. Unless this amendment was accepted, many of the contracts, representing probably about 70 per cent. of the output in the next year or so, would not be touched by the Bill.

Mr. Anderson remarked that unless the amendment, or one like it, were carried, it would mean that 80 per cent. of the coal for the next twelve months would be outside the scope of the Bill altogether. If it was possible for the coalowners to interfere with their contracts, it was possible for the same principle to be applied all round. It was unfair to the great municipalities not to interfere with these contracts. They heard again and again in the House of the need for public economy during the war on the part of the great municipalities. They agreed with this, though some of them did not carry it to the length that others would. What scope was there for economy when one got figures like these: This was the Glasgow Corporation's new bill for their coal supply for gas and electricity—811,000 tons for gas at an increase of 5s. 3d. per ton, and 160,000 tons for electricity at an increase of 6s. 3d. per ton. The total increase in the Glasgow Corporation's coal bill was going to be over £265,000. And then they asked the cities to practise economy. The very best way they could help the Glasgow Corporation to practise economy would be by relieving them of the increase on their coal contracts, and allowing them to get back to more normal figures. The same thing was true of the traders.

Mr. Pretyman said that, however much they might all wish to get the great advantage which this amendment would confer upon the community, on the whole it would take the Bill into a region into which they could not attempt to travel at this time. He hoped that, looking at the matter in this light, those who had proposed the amendment would be prepared to accept the lesser benefit the Bill proposed to confer, and would not attempt to confer the larger benefit which the Department concerned felt it could not agree to.

Mr. Mackinder said he represented a constituency in which very keen interest was taken in the Bill, not only by those who were merely domestic consumers, but also by those who were great industrial consumers, both of electricity and of gas. There was one question which was being asked in his constituency, and which would be asked; and he was going to put it now, because he hoped that the President of the Board of Trade would be able to give a satisfactory answer to it. He believed it was on the 6th of May last that the great meeting was held in London of the users of coal, and especially of representatives of what were commonly known as the public utility companies and municipalities. These municipalities and these great statutory companies raised the question at the meeting in the beginning of May, because they knew that immediately in front of them the time was approaching when the twelve months' contracts would have to be made. The question was being asked at the present time, and in no mincing phrases, what could be the state of inefficiency which could allow nearly three months to go by before a Bill was introduced, apparently designed to meet the very difficulty which they raised last May—a Bill which was introduced in a form which was almost ironical to them, and which would be described as a Bill "shutting the door when the horse had been stolen."

Mr. T. M. Healy argued that, though the amendment might, per-

haps, go too far in applying to all contracts, it should certainly apply to contracts made since this agitation began—namely, May and June contracts. Take gas companies, would not the House have been flooded with Private Bills to enable gas companies to raise their statutory charges, but for the hope and expectation that the Board of Trade would deal with the matter?

Sir A. MARKHAM remarked that it was no good the coalowner and the coal merchant saying they had not had the plunder. The public had had to pay. They had all had their finger in the pudding. He had had his—he had had more than he was entitled to.

Sir A. MOND remarked that, after all, the whole doctrine of the sanctity of contract was built upon the idea that there were two independent contracting parties who were at liberty to contract or not to contract. They were not talking now of people in the position of free and willing contractors, because one of the parties were bound to contract or close-down their gas-works or electric lighting works. He could not understand why some warning had not been given to all these public bodies that this legislation was going to be produced and telling them not to buy for a month. He would have thought the right honourable gentleman could have given his advice confidentially in this way. How did they know whether he would introduce a Bill, or what maximum price he was going to fix?

Mr. RUNCIMAN said that the suggestion which had been made was that, owing to necessity, local authorities had been bound during the last few weeks to make contracts above the standard prices in the Bill. He understood that a large number had been squeezed, in Scotland as well as in England; but very many had refrained from doing so, and would undoubtedly get the benefit of the Bill, if it passed. If the Bill had been introduced in April, this would have been before the war bonus was decided upon, before the re-adjustment of wages in Scotland, and before there had been anything like equilibrium in the Welsh coalfield. It would have been introduced at a time when materials were fluctuating in price with great rapidity, and at a time when it would have been impossible to state with any degree of accuracy whether 3s., 4s., or 5s. would be anything like a fair sum to put in the Bill. The Glasgow Corporation, by whose special case the Committee had been much impressed, bought before the Bill was introduced. It might be that they did their best to avoid doing so, and that their stocks were so low that they could not afford to run the risk of the market in any degree. If this were the case, there might certainly be some good reason for taking the position of the Corporation and others into due consideration. But this was quite a different proposition from the one before the House. The amendment would strike at the root of all commercial stability. It would cause a great deal of trouble and mischief in nearly all the industries, and would certainly do no good to those whom they wished to benefit. But the special case that had been put of corporations was one which he thought the Government were bound to consider; and he suggested that the amendment should not then be pressed to a division, and that the Government should, between now and the report stage, endeavour to meet the case of local authorities and those public utility companies which were limited in the payment of dividends. In one form or another the local authority was the State; and it might be that they were doing right to protect the State with respect to some of these contracts. He was very doubtful about the principle of the thing; but the Bill was purely one of expediency, and to deal with the case of the local authorities was quite a different matter from tearing-up all contracts which had been entered into before the introduction of the Bill. If they would negative the amendment, he would undertake that the Government would see what could be done for the local authorities and those in similar positions.

The amendment was negatived.

THE PENALTY PROVISION.

An amendment was then accepted to add to the words "if any person sells or offers for sale," the following: "Provided that a person shall not be liable to a fine under this provision if he shows that he had reasonable grounds to believe that he was not committing an offence."

Friday, July 23.

AN AMENDMENT AS TO CONTRACTS ACCEPTED.

Mr. S. ROBERTS moved to add, at the end of sub-section 4 of clause 1.:

> (5) It is hereby declared that nothing in this section shall affect the rights or obligations of any person under any contract or agreement for the sale of coal, except, in cases where the sale is in contravention of this section, as respects so much of the price as exceeds the maximum price which could have been charged for the coal if there had been no contravention of this section.

He pointed out that the words of clause 1 were that a contract which went beyond the price proposed in the Bill would be void. His amendment would make it only void as to the excess price of the coal over the standard price.

Mr. RUNCIMAN agreed that the request was not altogether unreasonable, but expressed the opinion that if the price was above that provided for in the Act, the customer ought to have the right to say whether or not he would go on with the contract.

Mr. M. HEALY said that, as the Bill stood, he apprehended that there would be no reason in the world why the person purchasing coal should not set up the defence that it had been sold in breach of the Statute, and so endeavour to escape payment.

Sir W. BEALE remarked that if the Government could accept an amendment substantially to this effect, he thought it would make the position a great deal clearer in law, and more equitable.

Mr. RUNCIMAN said it seemed to him there was something in favour of such an amendment as this; but he did not think it would be advisable to take it in exactly the form named. The better course would be to accept the amendment now, and put down amendments to it on the report stage.

The amendment was then agreed to.

SUGGESTED REVISION OF CONTRACTS.

Mr. DICKINSON moved, in sub-section 2 of clause 3, to leave out the words "commencement of this Act" [The sub-section reads: "This Act shall not apply to the sale of coal supplied in pursuance of a contract made before the commencement of this Act."], and to insert instead the following words:—

> 24th day of March, 1915. Provided that in any contract made between the 24th day of March, 1915, and the passing of this Act, it shall be lawful for any party thereto to give notice to the other party that he desires the contract to be revised with respect to coal to be supplied after the date of the notice; and thereupon he may apply to a judge of a County Court, who may revise the contract and may fix the price or prices to be paid for the coal to be supplied thereunder so as to make such price or prices equal to the price or prices which in the judge's opinion would have been inserted in the contract had it been concluded on the basis of the price or prices of the coal at the pit's mouth as fixed under the provisions of this Act.

The DEPUTY-CHAIRMAN (Mr. Maclean) doubted whether, in view of the debate on the previous day, when an amendment as to contracts was negatived, he could allow this one to be moved.

Mr. DICKINSON submitted that his was an alternative amendment. The first referred to all contracts; whereas his own did not.

Mr. RUNCIMAN said while the House had undoubtedly negatived any proposal for the tearing-up of all contracts, he would like to repeat the suggestion he had already made—that this subject must of necessity be dealt with, and reviewed by, the Board of Trade before the Bill arrived at the report stage. He hoped then to be able to make proposals which would remove some of the difficulties raised by this amendment.

The DEPUTY-CHAIRMAN explained that, as the President of the Board of Trade had suggested the previous night that he was prepared to consider the tearing-up of contracts with regard to specific bodies, he was left in a rather difficult position owing to the fact that technically the amendment was negatived. He thought, however, it would be better not to press the amendment now.

This course was agreed to.

Sir A. MARKHAM said the view that contracts were a sacred obligation which ought not to be disturbed was one that did not hold in times of national danger. It was not going to be a real living Bill if it dealt with only 20 per cent. of the output.

Sir C. CORY pointed out that coalowners who entered into contracts at extremely low prices to keep the pits going were still carrying them out; and it appeared only right that these owners should have the benefit of higher prices obtainable.

Mr. ANDERSON asked why, if the President of the Board of Trade was prepared to modify contracts in regard to coal going to the municipalities, he should not do the same with respect to coal which was going to be supplied to working-class households. In regard to manufacturers, the case was equally strong.

Sir E. CORNWALL thought by this time the President of the Board of Trade had realized that there was a very strong feeling in favour of applying the Bill to contracts.

Mr. WATT, again referring to the Glasgow Corporation contracts, asked for an assurance that corporations who had been "squeezed" would be considered.

Mr. RUNCIMAN replied that he could add nothing to what he said on the previous day. One of the charges just brought against him was that he then said he would do something to help the local authorities, who in another aspect were really the State.

It having been decided that the Act should not apply to Ireland, clause 3 was agreed to.

LIMITING CHARGES FOR WAGGON-HIRE.

The following clause dealing with the limitation of charge for waggon-hire was then added to the Bill:—

> (1) Where coal is conveyed from the pit's mouth over any railway in trucks not belonging to a railway company, the seller of such coal shall not be entitled to charge for the use of the trucks any sum exceeding by more than 50 per cent. the sum which the railway company conveying the coal was actually charging for the provision of trucks at the commencement of this Act.
>
> (2) If any person charges or attempts to charge for the use of any trucks in contravention of this section, he shall be liable, on summary conviction, to a fine not exceeding £100.

After another new clause—to limit the retail price of coal in London—had been withdrawn, the Bill was reported. This clause had for its object the limiting of the selling price of coal in London to a "sum equal to the price of that coal at the pit's mouth as fixed under this Act, together with the addition of 15s. per ton, or such greater amount, as the Board of Trade may allow in view of any proved increase in the cost of freight or distribution."

War Bonus Question at Sedgley.—When the Sedgley Urban District Council approved a recommendation of the Gas Committee to grant a war bonus of 1s. 6d. a week to the general gas workers, one of the members remarked that the men were not satisfied with this offer, and had decided to refuse it. He urged, therefore, that the question should be further considered. However, it was pointed out that the Council had no official knowledge that the men would refuse the grant and, under these circumstances, no further action was taken.

Big Destruction of Benzol.—Thousands of gallons of benzol were destroyed through a fire which occurred on Monday of last week at the Milnsbridge chemical-works of Messrs. J. W. Leitch and Co. The outbreak originated in a still in the benzol department; and directly after the alarm was given, there was an explosion, the report being heard for miles around. Several minor explosions occurred later; but, though many men were working at the time, only one was hurt, and his injuries were not serious. The benzol department consisted of seven sheds, six of which were gutted.

LEGAL INTELLIGENCE.

CHARGES AGAINST FORMER GAS OFFICIALS.

Accounts of the Walton-on-Thames and Weybridge Gas Company.

CENTRAL CRIMINAL COURT.—Thursday, July 22.

(*Before the* RECORDER OF LONDON *and a* JURY.)

Thomas Henry Lamb, lately Secretary of the Walton-on-Thames and Weybridge Gas Company, and George Waters Ross, until recently the Chief Clerk and Collector to the Company, surrendered to their bail to answer several charges arising out of alleged tampering with the books and funds of the Company. In the first place, they were indicted for unlawfully conspiring together to steal divers sums of money belonging to the Company; with making certain false entries in the books of the Company; and with omitting certain material particulars from the said books. To this, both prisoners pleaded "Not Guilty." Another indictment charged them with feloniously stealing certain sums of money—£88 7s. and £445 6s. 4d. A further indictment charged them with stealing £100 8s. 8d., £17 10s., and £99 7s. 4d. To these two indictments Lamb pleaded "Not Guilty" and Ross pleaded "Guilty." It will be recalled that the trial was removed, by order of the High Court, from the Surrey Quarter Sessions to London, after the case had been before the Magistrates at Kingston.

The charge against Lamb of stealing the three last-mentioned sums was proceeded with.

Mr. W. H. MORESBY (instructed by Mr. W. L. J. Crosby) prosecuted. Mr. ERNEST E. WILD, K.C., and Mr. A. S. COMYNS CARR defended Lamb; and Mr. DAVID WHITE appeared for Ross. The Solicitors for the defence were Messrs. White and Co.

Mr. MORESBY, in opening the case for the prosecution, said the Jury had heard the charges read out; and they would have gathered from the recital of them that they were serious charges. The question they would have to consider was whether Lamb, while in the service of the Gas Company, stole the three sums of money which had been referred to. He had said the charges were serious; and they were so, indeed. They were grave charges; and they were regrettable ones. They were regrettable, because if they were proved they must involve the downfall of a man who had been a thoroughly respectable person hitherto, well known in his district, and who had been for no less than 23 years Secretary of the Gas Company. While holding this responsible position, he had received an adequate salary of £265 a year, and had had a house, gas, and coals free; so that his position was a comfortable one. It was necessary to explain that this was not altogether a simple case; and there were one or two preliminary matters to which attention should be drawn. The Gas Company, as was the custom with such undertakings, had a main office—the Secretary's office—which was situated in Walton-on-Thames; and this was under the absolute control of the prisoner. All cash that was owing to the Company, for gas consumed or for residual products, was paid in to this particular office, and came under the immediate control of Lamb. Now Lamb, in this office, had with him the other prisoner, Ross (who had pleaded guilty) as the collector, to work with and under him; and the only other living soul in the office was a junior clerk he believed about nineteen years of age. The keys of the safe were possessed by Lamb and Ross; and it was important to notice, because it was a leading feature in the case, that all the accountancy relating to the money so received was done in this office, and Lamb alone was responsible for it. All the Company's books relating to receipts for gas and residuals were kept in this office; and the books to which it would be necessary to refer in this case were very few and very simple. In fact, there were only three particular books to bear in mind. The first was the daily cash book, in which all cash and cheques should be entered as and when received; and it would be obvious to anyone that a book of this kind must be the basis of all accountancy, because it was the first record of money received into the business. The second book was the general cash book, into which entries from the first book should be periodically made—say, weekly—and summarized; so that it was, in a sense, a second edition of the first book. The remaining book was the meter ledger, in which the various meter readings were entered from the readers' cards. In this book, also, the consumption was worked out in money values; so that there were really two entries. The duty of the prisoner was to enter the receipts in the first book, or see that they were entered—by Ross presumably—and having seen that they were entered, he had to make quite sure that when he paid into the bank periodically these payments were equal to the recorded payments in the book. This was his duty; and it was a duty in which, if his (Counsel's) information was correct, prisoner lamentably failed. Coming to the amounts specifically set forth in the charge, the £100 8s. 8d. related to a cheque from Messrs. Clayton, Limited, for tar. This cheque was duly received in the Secretary's office, and was endorsed by Ross, though the receipt for it was signed by Lamb. It was, however, not entered in the first book; and then, the process being started in this way, the following step was to pay the cheque into the bank. As it was not recorded in the daily cash-book, it would, of course, free an equivalent sum of money for Lamb to appropriate, if he liked. On an examination of the Company's books by skilled persons, it was discovered that a very large deficiency of funds existed; and the inference he would ask the Jury to draw was that not only could Lamb make use of the money so set free, but that he, in fact, did make use of it. In a charge of this kind, it was not in the least necessary to prove the theft of a specific sum on any particular day. If a fraud of this kind was perpetrated, it was quite impossible for the prosecution to say, "On such and such a day you stole these particular coins." The law did not require it; and the exigencies of this particular case prevented him saying that it did take place. It was quite obvious that the ingenious method of setting free a sum of money to be appropriated, which he contended was adopted by Lamb, might very well go on unobserved for a long time. It did, in fact, in this case go on until somebody, for some special reason, closely examined the account in question—that of Messrs. Clayton. The second cheque was for £99 7s. 4d., and related to the account of Messrs. Page and Co. for sulphate of ammonia. The facts were very similar to those of the preceding case; but this time the cheque was endorsed by Lamb, so that he knew right well that the amount was received. The receipt was signed by Ross. Again, no record appeared in the daily cash-book; but the cheque was ultimately paid in against recorded payments in this book, so setting free an equivalent amount of money received by the Company on some other day unknown to the prosecution, and misappropriated, as they said, by Lamb. The matter of the third cheque was more complex. This had reference to payment for gas supplied to Weybridge Railway Station; and, if proved, it was a particularly bad case, because to the system he had attempted to describe were added misleading entries in a book over which Lamb had absolute control, and which it was his duty to see was filled in correctly in every respect. At Lady-day, 1914, the meter-reader found there had been a consumption at Weybridge Station of 508,800 cubic feet, and in due course an account was sent to the Railway Company; the sum due for this amount of gas being £89 0s. 10d. The account was paid by a cheque which was endorsed by Lamb, and the Railway Company got a receipt which was signed by Lamb; so that he had a double opportunity of knowing that the Company had paid the amount named. The gas consumption that was entered in the meter ledger, however, was only 408,800 cubic feet—or 100,000 feet less than the correct amount; and the sum received was entered in the daily cash-book, not as £89 0s. 10d., but as £71 10s. 10d. Whoever put it in, must have known it was a wrong entry. Then, the account being short by £17 10s., the old process was gone through. The bank paying-in slip recorded the full £89 0s 10d., so that the difference of £17 10s. was set free from some other account to misappropriate, if Lamb chose to do it. It was quite obvious that practices of this kind, if indulged in, could not go on for ever without being found out. A day of reckoning must come; and it came in this way. Mr. Thomas Price, the Manager of the Company, had occasion to examine the ledgers; and he noticed that Clayton's account, among others, was not in credit, as it should have been, by the cheque to which reference had been made. Inquiries were set on foot; and as a result, Lamb, who was then Secretary of the Company, was asked to attend a Directors' meeting and give an explanation of the state in which the account was found. He did attend the meeting; but as probably the Jury would have gathered, if the facts alleged were capable of proof, no explanation was possible. No doubt it would be better to hear from the witnesses what the prisoner did say at the meeting. All he (Counsel) would remark of the statements was that, if the Jury believed them, they were of the very gravest import in this particular case. The Company, it should be added, were insured for the fidelity of their servants; and, in fact, they had been repaid a fractional part of the deficiency to which he had drawn attention.

Mr. *F. Clayton* (a Director of Messrs. Thomas Clayton, Limited, of Oldbury, who purchased tar from the Company), Mr. *A. E. Ingleby* (in the employ of Messrs. Charles Page and Co., of London, who bought sulphate of ammonia), and Mr. *Henry Lanham* (from the Accountant's Office, Waterloo Station) gave evidence as to receiving the invoices and sending on the cheques referred to by Counsel in his opening.

In cross-examination, Mr. Ingleby said, speaking not as an expert in handwriting, he thought the signatures of "Lamb" on the receipt and on the cheque were different.

Mr. *A. J. Brabner* (Manager of the Walton Branch of the London and South-Western Bank) having given evidence of the paying-in of the cheques referred to in the indictment,

Mr. *Thomas Price* (the Manager of the Company) was called. He stated that Ross occupied the position of Assistant-Secretary and Collector. There were two offices, an inner and an outer one. The two strong rooms and two safes were all in the outer office. So far as his knowledge went, Lamb and Ross had duplicate keys. There was in the outer office a clerk about 21 or 22 years of age. He had searched the daily cash book, and failed to find Clayton's cheque entered in it. The entries at the time the cheque was stated to have been received were all in the handwriting of Ross. Page's cheque, £99 7s. 4d., also was not entered; while the Railway Company's amount was wrongly entered.

Friday, July 23.

Mr. *Price*, in reply to further questions put to him by Mr. MORESBY, stated that the book in which the cash summary was entered was, at any rate in the main, in Lamb's handwriting. Clayton's invoice was made out by an assistant in witness's office—Mr. Vanner. The Clayton cheque was endorsed, as to the signature, by Lamb; and the words "Walton and Weybridge Gas Company" were in Ross's writing. The paying-in slip was in the writing, he believed, of the junior clerk in Lamb's office—Sedgley. This included Clayton's cheque. Page's invoice was in Vanner's writing. The cheque was endorsed in the writing of Lamb; while the receipt was in the writing of Ross. The Weybridge Station account, which showed 508,800 cubic feet of gas, £89 0s. 10d. was made out by Ross. The cheque sent by the Company was endorsed by Lamb, who also signed the receipt, which was on the cheque. It was the duty of prisoner to see that the figures on the meter-reader's card were entered correctly in the meter ledger. The consumption shown in this book was, however, 408,800, and the sum due was based upon this figure, showing a deficiency of £17 10s. The meter ledger was kept partly by Ross and partly by Sedgley. Since these matters had cropped up, he had gone very carefully through the books, and there were deficiencies exceeding the £217 6s. referred to in the indictment. In September last he spoke to Ross, who made a certain statement in reply. Following this up, he saw Lamb, who, before witness said anything, exclaimed: "I am awfully sorry, Price. For God's sake do not say anything about this. I can raise £1000 in 24 hours, and put matters straight." Witness replied that it was a matter he must put before the Directors. This was done.

Mr. WILD (in cross-examination): Did you say before the Magis-

trates at Kingston that Lamb used to leave the work to be done by Ross and Sedgley? Did he not spend much time in the garden?

Witness: Yes; I agree.

Cross-examination continued: Ross was Assistant Secretary and Collector, and had been with the Company 22 years; while Sedgley had been there for six years. Weekly rough summaries on loose sheets made by Ross were asked for when the case was before the Magistrates. He did not then know of their existence; but on searching the office they were discovered.

Mr. WILD: Is the cash summary book—that is, Lamb's book—a copy of these weekly summary sheets?

Witness: The entries do appear to be copies.

The RECORDER: Did you, when the case was before the Magistrates, appreciate the suggestion that the book for which Lamb was responsible was merely a copy of these loose weekly sheets which Ross made out?

Witness: I do now; but I did not then.

Mr. WILD: Can you find a single entry in the daily cash book in Lamb's writing which is false?

Witness: There is an omission on Aug. 6, 1913, of a cheque received then from the Weybridge Urban District Council, £145 2s. 3d. Ross was away on holiday at that time.

Cross-examination continued: In Clayton's case every entry was in Ross's handwriting, except the endorsement on the cheque. As to the Railway Company's case, the only writing of Lamb, again, was the receipt and endorsement on the back of the cheque. In Page's case, the receipt, which was separate from the cheque, was in Ross's writing. Ross's salary was £170 a year.

Mr. WILD: I suggest at the conversation referred to, Lamb said: "I am awfully sorry about this, Price. For God's sake try to get this hushed up for Ross's sake."

Witness: No.

Cross-examination resumed: The bank paying-in slip for Aug. 6, 1913, was, in his opinion, mainly in Sedgley's writing. The £145 2s. 3d. was in his writing. In the daily cash-book on that date some entries were made by Lamb and others by Sedgley, who was dismissed from the Company's employ with Lamb and Ross.

Re-examined: The receipt on the cheque from the Weybridge Council which had been referred to was by Lamb. The cheque was entered in the daily cash-book on Aug. 19, though the receipt was signed by Lamb on the 5th, and the cheque was paid into the bank on Aug. 6. He believed Lamb attended to his duties properly.

Mr. *W. A. Bilney*, J.P., a Director of the Company, said in September last year he attended an informal Board meeting at the Company's offices; there being also present Mr. Alfred Wood (the Chairman) and Mr. F. E. Elliott. Lamb came into the Board-room, and was asked for an explanation as to Messrs. Clayton's and Messrs. Warren's accounts. Before prisoner answered, witness cautioned him that he need not make any statements which might incriminate him. Lamb said: "I had those moneys; and I am very sorry for what I have done." The Chairman asked how much he had had, and Lamb replied about £300. It had been going on about eighteen months. "I had some speculations," continued Lamb, "on the Stock Exchange, and lost money by them. When I wanted any money, I used to ask Ross for it. He generally gave me £20 or £30 a month." Subsequently, Ross was interviewed. Lamb was at once suspended, and was asked to attend a full Board meeting the following day. On that occasion, the statements previously made were repeated; but Lamb then said he had had certainly not more than £500. The Company had fidelity guarantee policies of £1000 on Lamb, and £300 on Ross; and they had been paid the full amounts.

Cross-examined: The Auditors had not called his attention to any false entries by Lamb. Mr. Comyns Carr before the Magistrates raised the defence that this matter had been treated as a civil debt so far as Lamb was concerned.

The RECORDER: That would be no defence to the criminal charge.

Mr. WILD: The defence is that this is a civil debt.

Cross-examined: No resolution to prosecute was passed on the 24th of September. The decision to prosecute was taken by resolution a month later. Objection was raised by the Company's Solicitor to the production of correspondence with the Guarantee Society, and to the answering by witness of a number of questions; and these objections were upheld by the Bench, with the result that Mr. Comyns Carr declined to proceed with his cross-examination. Lamb said nothing about paying doctor's bills at the first meeting. The question of discharging the prisoners was not discussed before the meeting on the 24th. He had no vindictiveness whatever against the men. Lamb did not say at the second meeting that he had had £300 from Ross, who told him the total deficiency was £500. Nothing was said at the meeting about Sedgley not being guaranteed. The Board did not agree by a majority to leave the whole question of prosecution in the hands of the Guarantee Society. He had not heard that some of the Directors called at the offices of the Guarantee Society before the resolution to prosecute was passed. After the meeting on Sept. 24, the Guarantee Society wrote asking that a life policy of Lamb's might be handed over; and this was done, after proper authority had been given. It had been stated that £500 had been paid over by Lamb to the Guarantee Society; but it was not true to say that the matter was ever regarded as a civil debt. Witness was then questioned at length regarding the circumstances which led to the transfer of the trial from the Kingston Quarter Sessions to the Central Criminal Court.

Re-examined: Neither witness nor the Company cared in the least where the trial took place. He had known Lamb for over twenty years, and never had an unfriendly word with him. So far as he knew, there was no delay whatever in undertaking the prosecution. The books had, of course, to be carefully gone through. There had been, so far as he knew, no suggestion on the part of the Guarantee Society that any portion of the amount paid by them to the Company was received from Lamb. The prosecution was undertaken by the Company as a public duty.

Mr. *Alfred Wood* (the Chairman of the Company) gave evidence as to the interviews with Lamb. Prisoner was asked what had become of the money; and he said: "I had it." Asked what he had done with it, he replied that he had been speculating on the Stock Exchange. Further, he said, the frauds extended to about £300. At the second interview Lamb was told that a certain account [not in the charge] had been paid, and that he had had it. Lamb said: "If Ross says so, I must have had it." He then said the frauds might be £500, but not more. The Company had at no time treated these sums as a civil debt owing by Lamb; and the Company had had no communication with the prisoner in regard to so treating it.

Cross-examined, witness denied that the subject of a prosecution was mentioned at either of the meetings. It was decided to have the books put in the Auditors' hands to see what was the state of affairs.

Mr. WILD: I suggest this matter was left in the hands of the Guarantee Society to settle?

Witness: I say, no.

Further examined: The matter of the Guarantee Society was left in the hands of Mr. Bilney, who saw the Secretary. The Directors, other than Mr. Bilney, had, so far as he knew, nothing to do with the Guarantee Society. He knew the Society had had £500 from Mr. and Mrs. Lamb.

Re-examined: His Company had nothing whatever to do with the arrangement for the Guarantee Society to take over Lamb's policy. Until that day, he had never heard it said that prisoner was "slack" in his duties.

Saturday, July 24.

Sergeant *Parrish*, stationed at Hersham, said he was on duty when Lamb surrendered last December. The warrant was read to him, and he said: "I am not guilty; I had better not say anything."

This concluded the case for the prosecution.

Mr. WILD submitted as a point of law that there was no evidence on the charge preferred, which was one of larceny. There was no charge of receiving; and there was no evidence whatever, on the uncontradicted statements of the prosecution, of any larceny.

The RECORDER remarked that this must be for the Jury to say. It entirely depended upon whether or not the prisoner was an accessory before the fact.

Mr. WILD, proceeding then to address the Jury, said he was glad, from the point of view of the prisoner, that they would decide the case, not upon any technical point of law, but upon its merits. Upon his instructions, this was one of the most scandalous prosecutions ever preferred in a Court of Justice; and it was not until they got into the present Court that the defence had had an opportunity of developing it or of it being put forward properly. He (Counsel) was not there to say that Lamb had not been inattentive to his work; but he did suggest that he had not been guilty of any criminal act. In the book which formed the basis of this case, over the material dates, all the entries were in Ross's handwriting, and the omissions also were due to him. The summary sheets were also in Ross's writing; and these were copied by Lamb into the cash summary book. As to the documents put in, there was no handwriting of Lamb except by way of endorsement of cheques. Lamb had never taken a farthing of his employers' money; but unfortunately he had been buying stocks, and had also incurred heavy expense through his wife's illness, and so wanted money. Ross told him he had just got money from his wife; and he lent Lamb sums amounting to a total of £300, for which he handed over an endowment policy as security. On Sept. 23, Ross for the first time told Lamb he had defrauded his employers of £500, and that the £300 which Lamb had had came from this. Ross asked Lamb to try to get the matter hushed up, and he at once consented. The only sort of evidence against the prisoner was in connection with the Board-room meetings. Lamb stated then that Ross had told him about the money that he had had. Having inadvertently let Lamb into this awful difficulty, Ross was now prepared to tell the truth—that beyond this £300 the whole of the money had gone into his (Ross's) pocket. The Directors having talked over a prosecution, decided by a majority to leave the matter entirely in the hands of the Guarantee Society. Now, the defence was that the matter from the beginning was a civil debt. The fact that the people who ought to prosecute had so treated it, was strong evidence that it was a civil matter. Before themselves saying anything about a prosecution, the Company allowed the Society to deal with the matter; and the Society then tricked Lamb into paying over the £500—the prosecution being used as a lever against the unfortunate man in the dock and his wife. This money having somehow been scraped together, was handed over, and a receipt was given by the Society to the effect that it was received "in full settlement and discharge of all claims under this guarantee." If ever there were blackmailing letters written, those addressed by the Guarantee Society to Lamb deserved this term. Unless the Guarantee Society got this £500, it was open to them to raise the point that there had been no dishonesty, and so refuse to pay the £1000 to the Gas Company. Why should Lamb have paid over the money, unless he considered it was a civil matter? If the Society really believed Lamb had committed fraud, they had compounded a felony, and they should be in the dock with him. On Oct. 14, the receipt was given in full discharge by the Society; and on Oct. 22, having got their £1000 from the Society (£500 of which was Lamb's money), then "in the interests of the public," the Gas Company decided to prosecute. If ever there was a discreditable charge, it was this one. It was a wicked prosecution of this unhappy man. When the case in the first place came before the Bench at Kingston, the defence were prevented from putting forward their case. From the beginning, every obstacle was placed in the way of the defence; and now the Gas Company were afraid of being sued for malicious prosecution in the event of the prisoner's acquittal. The prosecution was one that never should have been brought.

Monday, July 26.

Thomas Henry Lamb, at the opening of the proceedings this morning, entered the witness-box, and was examined by Mr. COMYNS CARR. He explained the position of the house on the works and the offices, and his duties as Secretary. The books he personally kept were the trade ledger, general ledger, minute books, shareholders register, and the stock and share registers—in addition to the cash summary book. It was no part of his duty to keep the daily cash-book. The meter-rental ledger, it was also Ross's duty to keep.

The RECORDER: As Secretary would it be your duty to check the books from time to time, particularly before the audit?

Witness: Yes.

Examination: Unfortunately he did not do so. He had not fulfilled his duties to the full in this respect during the last few years. The local Auditor, who went through Ross's books, came in frequently and looked over them. He never called witness's attention to any irregularity in Ross's books; and the same remark applied to the other Auditor, who was an accountant. The cheques that had been produced were endorsed by witness; and this was quite the usual practice. They were brought to him in batches from the office for this purpose. Page's receipt was signed in his (witness's) name by Ross. The loose cash was kept in one of the strong rooms, to which there were two keys, one of which was kept by Ross and the other by Sedgley. Of the strong room in which books were kept, witness had one key, and the other was kept in a drawer. Being in want of money, owing to Stock Exchange transactions and a serious illness of his wife, he asked Ross where he could raise some, and Ross said his wife had come into some money, and he thought he could arrange to lend witness what he wanted. He did, in fact, lend him several sums, on the security of an endowment policy. All this time he had no suspicion that Ross had not come by the money the way he said he did. He never had any part in, or knowledge of, the stealing of the sums referred to in the indictment or any other sums, or of any entries in or omissions from the books. The first he heard of the matter was on Sept. 23 from Ross, who said he was short of slot money, and took Clayton's cheque and others to pay the amount. The shortage, he stated, was £500; and the £300 witness had had came out of this. He asked witness whether he could repay the £300, and also whether he would try to get the matter hushed up. Price then came in, and witness did ask him; but he said nothing about raising £1000 in 24 hours. He then went on to state what took place at the interviews with the Directors. At neither interview did he admit that he was a party at any time to the felonies committed by Ross. He was not given any opportunity to properly explain matters. Witness bore out the statements made by Counsel as to the negotiations with the Guarantee Society.

At this stage, further argument arose as to securing the evidence of Mr. Sherwell, the Manager of the Guarantee Society. Counsel for the prosecution declined to call him; and Counsel for the defence also refused to put in the box a witness who, he said, "was the agent of the Gas Company." Several of the jurors, however, emphatically expressed the opinion that Mr. Sherwell's evidence would be of great interest, and that the prosecution should call him. The Recorder pointed out that he could not call him; and Mr. Sherwell could not appear unless he was called.

Mr. MORESBY said, as the defence would not call Mr. Sherwell, he would later on do so himself.

Further examined, witness said when he paid over the £500 to the Guarantee Society, he took it the matter was regarded as a civil debt, and that some moral responsibility rested on him as Secretary for the non-detection of Ross's frauds. Sherwell told him the Directors of the Gas Company had authorized him to say the payment of this amount would settle the matter.

At the conclusion of this part of the witness's cross-examination,

Dr. *Coram James* stated that he had known prisoner well for over seventeen years. He had looked upon him, and still did, as a person of the highest commercial integrity. He would still be prepared to trust him to any extent.

Lamb again entered the witness-box after the adjournment, and was cross examined by Mr. MORESBY. His association with the Directors was quite a pleasant one until these proceedings arose. So far as Mr. Price was concerned, he could not say the same. As superior officer, he had, of course, free access to all the books, as well as the strong-rooms and safes. He agreed that he was responsible for the supervision of Ross, as regarded the receipt of money. But though the books were there, he never examined them. Before signing the half-yearly balance-sheets he did not examine the bye-products ledger. When making up the June accounts in the year referred to, he did not notice that the Clayton and Page cheques had not been credited. He had had one or two investment dealings on the Stock Exchange before the occasion already referred to. He denied that he had had any dealings, direct or indirect, with bookmakers who were named in Court. At local race-meetings he had put small sums on horses.

Mr. MORESBY: Do you now justify having borrowed money of your subordinate, who was younger than you, and had a salary of £170?

Witness: I did not borrow from him, but from his wife.

Have you ever heard of a case in which one man has put his liberty in peril in order to provide for the needs of another?—No.

Do you believe Ross did that?—The £300 must have come from there.

The RECORDER: It is suggested that unless you had been dishonest there was no liability under the guarantee policy.

Mr. MORESBY: Did not the Society themselves threaten a prosecution for fraud? So that the whole object of your negotiations was to stave off this prosecution?

Witness: I suppose so.

Can you show me a single shred of writing, through the whole of the negotiations, to indicate that the Gas Company had anything to do with the matter?—No.

When you got a receipt from the Society for the £500, did you not recognize that, if it was to prevent all further proceedings on the part of anybody, it was vital to have the name of the Gas Company mentioned—which is not the case on the receipt?—I relied on the assurance of the Society that the payment would settle everything. The solicitor was present at the interview.

How came you to hand over £500, if your only fault was borrowing from Ross?—I was advised to do so; and I am sorry now I did so.

Re-examined: He had heard it stated that Ross's total defalcations amounted to some £1800; but the £300 was all he (witness) had ever had.

The Court sat late to hear further evidence; but the report of this part of the proceedings must be held over until next week.

WORK DELAYED BY RETORT-HOUSE FUMES.

Action against the Conway Corporation.

A dispute connected with the erection of four ventilators in the retort-house of the Conway Corporation Gas-Works occupied Mr. Justice Bailhache, sitting without a Jury, at Birmingham Assizes last Tuesday. The plaintiffs were Messrs. Ash and Lacy, Limited, makers of tanks and constructional ironwork, who sought to recover from the Conway Corporation £58 1s. alleged to have been lost through the men and plant employed on the work being idle for several hours daily in consequence of fumes said to come from the retort-house rendering work impossible.

Mr. E. W. CAVE, for plaintiffs, explained that the original claim was for £319 [the price of goods sold and work done under the contract], in addition to the £58 1s. Since the issue of the writ, however, defendants had paid into Court the sum agreed upon as the price of the work. The action was now confined to the damages for loss alleged to have been sustained by plaintiffs owing to the conduct of the defendants in putting difficulties in their way in carrying out the work. The contract was for the erection of four ventilation shafts in the roof of the retort-house of the Conway Corporation gas-works. The manufacturing operations caused fumes to arise inside the retort-house which were not only of a disagreeable, but of a dangerous, character. When the men came to erect the ventilators, they found that at intervals during the day the process of charging and discharging the retorts went on, and that the fumes escaped through the hole where the ventilators were to be put in. The result was that the workmen were suddenly exposed to the gas, and had to descend and take refuge on the ground until the operations were over. Counsel went on to say that 1548 hours' time was lost by the men owing to the fumes. It was an estimated figure, which, at 9d. an hour, gave the amount claimed. Defendants declined to pay the additional amount, but said they would pay the £319 on condition that they received a receipt in full discharge of their liability. This plaintiffs refused, and eventually defendants sent a cheque for £319, which plaintiffs returned.

His LORDSHIP asked whether it was not common knowledge that there would be fumes in a retort-house,

Mr. CAVE: But ought they to be expected to know that the process of making gas in this retort-house was of such a nature that the people engaged in putting in the ventilators would be affected by it?

His LORDSHIP: Is there anything peculiar in the way in which this Corporation make their gas? What do you put ventilators in the roof of a retort-house for except for getting rid of the fumes generated inside the retort-house? You might easily have stipulated that the retort-house should not be used.

Mr. GRAHAM, for the defendants, in reply to a question by his Lordship as to whether the £58 1s. was disputed, said it was a great deal too much. He thought it should be nothing; but on the assumption that it ought to be anything, he considered £14 was sufficient.

Mr. *W. I. Ash*, a Director of the plaintiff Company, said that when he sent in the tender for the work, he had no idea how many retort-houses there were, nor did he anticipate any difficulty in the men proceeding continuously with their work. No indication was given to him that this would be the case. He went down to Conway while the work was in progress and saw the Corporation engineer. He discussed the firing times with him, and was told that they were 6 a.m. to 6.30, 8 to 8.30, 10 to 10.30, 12 to 12.30 p.m., 2 to 2.30, 4 to 4.30, and 6 to 6.30—seven times a day, and half an hour each time. The work was begun on Aug. 4 and finished early in November. In estimating the amount of the tender he did not take into consideration at all any time which would be lost by the men having to come down from the roof when the fumes were rising, and getting back again.

In cross-examination, witness agreed that he knew the ventilators were being erected to carry away the fumes. He had heard that an injunction had been obtained against the Conway Corporation on account of the fumes from the retorts.

Mr. GRAHAM: The necessity for four ventilators on this short span of roof must indicate a considerable production of noxious gas?

Witness: The troubles of the Conway Corporation did not occupy our thoughts. The men lost three quarters of an hour each firing.

Mr. GRAHAM contended that the time lost was lost largely on account of the absence of tools and want of system by plaintiffs.

Mr. *L. F. Guttridge*, plaintiffs' Assistant-Manager, gave evidence as to a conversation he had with the Chairman of the Conway Gas Committee as to the fumes. He told that gentleman that the men could not work in the fumes, and he replied: "We will fire one end while your men are working at the other."

At the close of the case,

His LORDSHIP said he was against plaintiffs. He did not think they had any claim in law. Judgment would therefore be for defendants on the additional amount. Plaintiffs would have judgment for the £319 paid into Court.

Water Supply Rights at Birr (King's County).

The Master of the Rolls in the Irish High Court, Dublin, delivered judgment in a case in which the Birr (No. 1) Rural District Council were plaintiffs and the Birr Urban District Council defendants, relating to the water supply to the town of Birr. Both Councils are water authorities. Plaintiffs complained that defendants wrongfully entered their territory, laid mains, and secured contracts for the water supply to the military authorities, a laundry, and some private residences. Defendants said that, after full publication of statutory notices and the holding of a public inquiry, they laid the mains complained of with full knowledge, and without objection on the part of the plaintiffs. His Lordship said the real question at issue was whether plaintiffs had no rights to the lands on which the works were erected and the pipes laid; and the evidence showed beyond doubt that plaintiffs themselves consented to the supplying of the barracks by defendants. On this consent large expenditure was incurred. Plaintiffs had full power to consent, and, having done so, this disposed of the action.

MISCELLANEOUS NEWS.

EUROPEAN GAS COMPANY.

Gas Supply in France during the War.

The Annual General Meeting of the European Gas Company was held last Tuesday, at the London Offices, Finsbury House, Blomfield Street, E.C.—Mr. H. E. JONES in the chair.

The SECRETARY (Mr. W. B. Brady) read the notice convening the meeting, and then the annual report and the statement of accounts. The report was as follows:

The war has necessarily affected the Company's business to a considerable extent during the past financial year—some stations having suffered more severely than others. Thus at Amiens, which was for a short time in the occupation of the enemy, the reduction in the sale of gas has been serious. This has also been the case at Boulogne. But in other towns the falling-off has not been so marked; and, moreover, the year under review had the benefit of four prosperous months before the outbreak of the war.

The Company's profits have been greatly reduced by the high rates of freight which have ruled since the war, notwithstanding that there was an improvement in the return from coke.

The accounts show that the year's profits are insufficient to provide for the payment of the usual dividend; but the Directors, after full consideration, recommend that the difference necessary to meet such payment be taken from undivided profits, and that the same dividend as in previous years be paid—viz., 2os. per share, free of income-tax, towards which 10s. per share was paid on Feb. 1 last.

The average length of the Company's concessions is now 26 years.

The exceptional decline in the prices of all securities consequent on the war has still further brought down the Stock Exchange values of the investments held by the Company—to £46,162 below the amount at which they stand on the balance-sheet now before the shareholders. This difference is partly covered by the reserve of £12,219 for the depreciation of investments. It is unlikely, however, that the Company will be forced to realize any of the securities it now holds during the present financial crisis.

The efficiency of the manufacturing and distributing plant at the several stations has been fully maintained.

The Directors have to report with much regret the death of their former Chairman, Mr. Robert Hesketh Jones. Pursuant to the regulations of the Company they have filled up the vacancy, and have nominated C. C. Carpenter, Esq., M.Inst.C.E., D.Sc., as a Director, subject to confirmation by the shareholders at this meeting.

The Directors who retire by rotation are R. S. Gardiner, Esq., and A. T. Eastman, Esq.; and the retiring Auditors are J. Reeson, Esq., and H. J. Luff, Esq., who, being eligible for re-election, offer themselves accordingly.

WAR, BUT NOT AN UNSATISFACTORY ACCOUNT.

The CHAIRMAN said it became his duty to address the shareholders on the report and accounts for the past year. He thought they would agree with him that probably in the whole history of the Company they had never met under quite such extraordinary circumstances as that day, having regard to the fact that the country in which their works were all situated had been at war during the whole of the past twelve months. He did not suppose any of them, when they met this time last year, could have conceived that such an upheaval and overthrow of everything which they considered equitably and morally right, and in some respects politically right, could ever have taken place. The war, as they all too well knew, was going on. Perhaps the shareholders knew more of it than he did; and it would therefore ill become him to waste their time in any reflections upon it of any kind whatever. In regard to the Company's own immediate history, he had to stand there—perhaps at the first since the war of the annual meetings of public companies—to give some account of what had happened during the twelve months that had elapsed. He ventured to think, however, that few chairmen would be able to meet their shareholders with a more satisfactory report in the circumstances than the Directors presented that day.

THE LATE CHAIRMAN AND THE NEW DIRECTOR.

Before dealing with any of the details of the year, it was his duty, and his inclination, to refer to the loss the Company had sustained by the death of Mr. R. Hesketh Jones, their former Chairman. The shareholders would have noticed that, for some little time before his death, Mr. Jones had allowed some of the work and responsibility to fall upon his (the Chairman's) shoulders. When their late friend had an accident in Paris some five years ago, he then felt that he would like to retire; but he (the Chairman) was bound to say, when he got better, he listened to the representations of their Managing-Director (Mr. W. Williams) and himself, and came back to the Board. He even went further than that, though he at first demurred, and resumed his duties as Chairman. He should like to say that besides the loss of their late Chairman's great business perspicacity, his decease was a personal loss to his colleagues, and not more to the others than to himself. When he (the Chairman) first joined their direction, he had known Mr. Hesketh Jones by repute for a long time; but they were comparatively strangers. He should like to acknowledge here the benevolent, kindly, and genial way in which the late Chairman always treated his colleagues, and him personally, because a technical director was not always the most agreeable personality to deal with. But they got on splendidly together. He recollected very well the almost affectionate passages there were between them when Mr. Hesketh Jones was most solicitous for the advancement of one of his (the Chairman's) own sons to a vacancy he (Mr. Hesketh Jones) was causing by retirement from another Board. The highest compliment the Directors could pay to their deceased friend was to replace the abilities that he brought to their counsels by selecting the best possible representative, the best possible gas administrator, and the most enlightened and cultivated (he would not say cultured, because that was a German term) engineer and gas manager in the kingdom. That was the gentleman whose election he should presently have to propose to the shareholders should be confirmed—Mr. Charles Carpenter, D.Sc., the eminent Chairman of the South Metropolitan Gas Company. He was a member of the High Explosives Committee, and was now doing distinguished service for the State; and in many ways, and in every way, he was a great benefactor to the gas industry. He was sure the shareholders would support the action of the Board in this matter in the most cordial and unanimous fashion.

THE FULL DIVIDEND.

The next point he had to deal with was the dividend. Perhaps the shareholders were surprised when they learned that they were, under the circumstances of the times, to receive the full dividend. This was announced in the papers some time ago, because the Directors desired to alleviate any anxiety in this regard, and to prevent any shareholders dealing with their shares under any misapprehension. This was (if he might use a colloquialism) "a tall order" in a year when nearly every British gas company had raised the price of gas, and, by force of the sliding-scale, would have to announce to the shareholders a diminished dividend. The Directors did not arrive at the conclusion to do this, under all the circumstances—under all the anxieties and the duress in regard to material, labour, and other things—without great thought. But this was a year in which they all wanted all the income they could get; and the Company had a number of French shareholders who had suffered more hardly than they had done here through the war, and by them, he was sure, the undiminished dividend would be gratefully received. He could not tell the shareholders that the dividend had been exactly earned during the year; but the amount they had taken from their resources in order to give it to the shareholders was not considerable for a company in such happy circumstances as theirs. The shareholders had been told before, and they had just heard read, the amount of the investments in which the reserves of the Company had been placed, and the considerable sum that they ordinarily would realize. They were not exactly saleable just now at the full price; but the Company had a small balance in a fund to meet any deficiency in value. This fund of about £12,000 was quite large enough (though the entire difference in the values that day was £46,000) when they bore in mind that three parts of the securities were repayable at par. But the Board thought that, with prudence, and short of some grievous calamity arising, there would not be any occasion to even consider the realization of the bulk of these investments.

FORESIGHT IN COAL STORAGE.

It was his pleasure generally, in addressing meetings of shareholders, to go into technical details; but this was a Company where it was not desirable, for many reasons, to enter into the technical operations. The shareholders, however, could accept his assurance that the whole of the works were in first-rate order, and had been fully maintained. They might also accept his assurance that the working results throughout their stations were up to the standard of the past, and in some cases superior. The report told them that freights had gone very much against the Company; and in regard to the price of coal, the outlook at one time was very serious. If, however, the results had been so good as to earn the shareholders their dividend, with the slight qualification he had indicated, this was due chiefly to two causes: First, the war did not break out until the Company had enjoyed four months of prosperity—perhaps the most prosperous time the Company had ever experienced. They had had the plant at their works reinforced, and put into the most economic condition. They had also renewed their contract for coal at a lower price; and the four months promised a year of unexampled prosperity. But this was afterwards neutralized by the effects of the war. The rise in freights on coal, for instance, was so serious that the Directors had to make representations on the subject to the French authorities. They would have felt the circumstances in a much heavier degree had it not been for the extraordinary foresight, judgment, ability, and great energy displayed by their Managing Director, who had been careful, as he always had been, to keep a large stock of coal at the works. Owing to this, during the first few months of the hardship, this Company went free of coal trouble; and when the Deputy-Chairman (Mr. R. S. Gardiner), who had extensive connections and relations with the gas companies in France, came back after a visit to several important places in France (where they were then actually almost without any coal worth speaking of in their stores), he was able to tell the Directors that, in passing some of their own works, he was amazed to see the splendid provision the Managing-Director had made. [Applause.] From the cheerful assent of the shareholders to his compliment, he was sure he would gratify them much more by telling them that the Board felt bound under the circumstances, when they realized the great danger of which Mr. Williams had relieved them, and what great prosperity he had brought to the Company by his foresight, to make an addition to his annual emoluments, which he considered adequate, and for which he expressed his obligation. [Hear, hear.] The Directors were certain the shareholders would feel towards Mr. Williams as they themselves did over the exercise of his ability and foresight, which meant so much to them.

RETICENCE, BUT GOOD ASSURANCE.

This, as he had said before, was especially a time for reticence, and, he would add, reticence on the shareholders' side in not asking him questions which he could only answer by telling them that he must be reticent. He had informed them that their works were in good order, and that the operations were good. He must ask them to accept this, as well as his assurance that the Board had not by any means drained the resources open to them, and which resources were under the control of a Board constituted of men like Mr. Chaloner Smith, who was expert in financial matters; Mr. Carpenter, who was the head of one of the most important London Gas Companies; Mr. Gardiner, who was an old hand at the administration of companies—especially Continental; Mr. Eastman, who sat on another gas board; and lastly himself (the Chairman). The shareholders

might take it that, with such a Board, no risk was being run in paying the proposed dividend.

A NEW ERA FOR GAS—IMPORTANCE OF RESIDUAL PRODUCTS.

Generally upon the gas situation, he should like to say that, speaking broadly of the future position, gas had entered almost upon a new era. New things were being accomplished, and a new position was being acquired in the commercial world and in the political world. He had stated that Mr. Carpenter sat, and rightly, upon the very important High Explosives Committee of the War Office. In this connection, it would interest the shareholders to learn that the gas undertakings throughout Great Britain were now providing an explosive which formerly was ignored—an explosive of the very highest value—by a process which Mr. Carpenter introduced, and that this was being done on such an economical footing that they were able to tell the War Office that, neither in plant nor in service, would there be anything to pay for beyond the material itself, which passed through the hands of contractors to eliminate from the tar. Besides this, the times of stress in this country and in France last year taught people the value of coke as a fuel; and it taught them another lesson, which he had often been surprised was not recognized before—that was, the enforced production by gas undertakings of good fuel like coke independently, and without any primary aim at profit. Coke had to be produced, according to the sale of gas, whether they liked it or not. If people would not buy it, then gas-works would have to give it away. This element was one of the greatest securities to the poorest people, who were the largest users of this fuel, as well as to manufacturers who, he hoped, would be in the future greater users of it than of old. They obtained greater certainty in making a contract for coke instead of coal, for the retorts at gas-works near them would always be producing the material, and they would never have to go short. Then another of their products—sulphur—was becoming of increased value just now on account of the high price of sulphuric acid. He would only be wasting time if he went into the romance of all the hydrocarbons which their tar developed. But he might say that in every way the residual products of gas-works were going to be better known and be better understood and inure to the advantage of gas manufacturers to a degree that had never been recognized before.

THE PRICE OF GAS.

One other matter to which he wished to refer was the price of gas. The average price over the whole of their works was in round figures 4s. per 1000 cubic feet. This was a very low charge for France. The shareholders might depend upon it that the Company would always have a prosperous future so long as they maintained this position. It was a price which made gas easily available and useful as a fuel. Whether they be gas companies working under concessions as abroad, or whether they be companies working as at home under sliding-scales or maximum prices, there was no element that would so conduce to their permanent and definite security and prosperity as selling gas at a low price, as was accomplished in the towns of France which their own Company illuminated.

The DEPUTY-CHAIRMAN (Mr. R. S. Gardiner) seconded the motion, which was unanimously carried.

The DEPUTY-CHAIRMAN then moved the confirmation of the interim dividend of 10s. per share less 6d. per share in respect of the shares held in France, and the declaration of a final dividend for the year ended March 31 at the rate of 10s., free of income-tax, and subject to the deduction of French stamp and transfer duty of 6d. per share in respect of shares held in France.

The CHAIRMAN seconded the motion, which was unanimously carried.

Moved by the CHAIRMAN, and seconded by the DEPUTY-CHAIRMAN, Mr. Carpenter's election as a Director was heartily confirmed. Both speakers remarked upon the admiration which all entertained for the services of Mr. Carpenter to the gas industry, and upon the good fortune of the Company in having obtained his services, which had already proved of great advantage to the concern.

Mr. CARPENTER thanked the shareholders very heartily for their endorsement of the honour bestowed upon him by the Board when they asked him to become a Director.

Proposed by the CHAIRMAN, and seconded by Mr. H. C. SMITH, the Deputy-Chairman and Mr. A. T. Eastman were re-elected to their seats at the Board.

Moved by Mr. WILLIAM RICHARDS, and seconded by Mr. BERNARD F. HARRIS, the Auditors (Messrs. J. Reeson and H. J. Luff) were re-appointed.

LOYAL WORKING IN FRANCE—WELL-DESERVED RECOGNITION.

The CHAIRMAN asked the shareholders to express their thanks to their staff at home and abroad. At home they were so familiar with Mr. Brady and the competent members of the staff, that he need not say anything in their praise. Some of them were away by force of the war; so that they were short-handed in the office. But those remaining had done their official work with a zeal and an ability that left nothing to be desired. In France, some of their managers had been called to the Colours. Some of them had returned for the time being; and some had not yet been absolutely called up, but were daily expecting to be. Their operations for the Company were carried on in various parts of France; those who were in the North of France worked under some disadvantage and considerable danger. Bombs and shells fell not far from their works at Amiens; and they were lucky to have escaped destruction of their property. The works of the other Company in Amiens suffered some injury. German regiments had been twice through the town, so that the shareholders might imagine what sort of life their unfortunate managers had had there. All over France there was a shortage of men, difficulty in getting material, and anxiety about coal supplies. The shareholders could imagine that if these conditions made the Directors weary and anxious, how much more must they affect the men who were in daily danger, or at one time were in daily danger, of losing their homes and hearths. Through it all, their managers had worked steadily and well, and so had all the operatives, whom the Directors treated with every indulgence. They granted them everything which could conduce to their comfort. There were pension and sick funds, and things of that sort. Therefore he thought he might take credit for the Company for thoroughly caring for their operatives, who, on the other hand, replied by their industry and good service.

Mr. CARPENTER said he was very pleased to have the opportunity of seconding this proposal. He knew something of the difficulties of carrying on a gas-works in ordinary times, but the difficulty of carrying on undertakings such as they had in different parts of France, under present circumstances, was great indeed. The difficulties with regard to materials and labour were important, and were felt in France as over here. But it was very remarkable how the returns from the different stations which came before the Board had been maintained under the stress produced by the shortage of material and with the labour they had. The latter they could not describe as indifferent, but it was different from the highest class of skilled labour which, under ordinary circumstances, a gas-works obtained. A great deal was due to their managers for the admirable manner in which they had carried on the works.

Mr. WILLIAMS thanked the shareholders on behalf of the staff in London and abroad. The past year, he remarked, had been a very strenuous one; and there did not appear to be any immediate prospect of things getting into normal condition. But the shareholders might depend upon the staffs at the different stations and in London doing the best they could for the interests of the Company.

Moved by Mr. J. REESON, and seconded by Mr. J. H. SOLOMON, a cordial vote of thanks was passed to the Chairman and Directors.

GAS PRICES AT CARLISLE.

A Council Debate.

There was a lengthy debate in the Carlisle City Council, before the proposal of the Gas Committee to increase the price of gas from 2s. to 2s. 4d. per 1000 cubic feet to all consumers was agreed to—as briefly recorded in the last issue of the "JOURNAL."

Mr. J. P. BUCK (the Chairman of the Gas Committee), in proposing the resolution increasing the price, as from the 1st inst., said that when the Council sanctioned the reduction in the price of gas, to take effect from the beginning of 1914, some members had great misgivings as to the result of such a drastic change. The reduction then made was from 2s. 3d. to 2s. per 1000 cubic feet to the ordinary consumers, and 2s. 6d. to 2s. to prepayment meter users. At the same time, some of the charges to the outlying districts were lowered. This policy had been amply justified by events; and, in addition to this, the works had been managed through a very difficult time with great care and efficiency, which reflected considerable credit upon the Manager (Mr. E. G. Hutchinson). They had paid about £2000 less for coal and oil than a year ago, though they had sold nearly 10 million cubic feet more gas. Of course, coal and oil were bought more cheaply in June, 1914, than in 1913. After drawing attention to various other items, he said there was a sum of £360, which represented what had been paid to the officials and workers who were serving in the army. He felt sure no member of the Council would grudge what was paid to the men who had willingly given up their home life and comforts to join the forces defending the Empire. In spite of the various unforeseen difficulties, the total expenditure was £42,869, against a total in 1914 of £45,458—though they had sold 10 million cubic feet more gas. With such a saving on the expenditure side, one might have expected some better result than a gross profit of £4428, against £7791 the previous year. But the lowering of the price had caused a reduction in the receipts from gas of £2767; while residuals had proved extremely disappointing. Bearing in mind the obsolete nature of the carbonizing plant with which he had to deal, the Manager had ample reason to congratulate himself upon the results he had achieved. As to the rise in the price of gas which was now proposed, the Committee were faced with the fact that, presuming as much gas was required this year as last, coal would cost them £9000 more; while other increases made a total of £11,350 to be provided for. Taking into account additional receipts and economies anticipated, there was left a deficit of £6700 to be met. Now, 2s. 4d. per 1000 cubic feet, was a very low price, even in normal times; and he thought gas was cheaper than burning coal.

Mr. LOWTHIAN opposed the motion, and moved as an amendment that the price of gas be increased 2d. per 1000 cubic feet. In past years, he said, the gas-works had helped the city more than they were ever likely to lose. The works had cost £150,000, and had been paid for, except some £13,000 at present outstanding, out of revenue; and the gas consumers, who included the poorest of the population, had had to bear their share. In addition to this, they had paid £200,000 to the relief of the rates. If the price had to be increased in bad years, he argued that it should be reduced in good years. They were all gratified to learn that there had been a record production and consumption of gas; and what had been done during the past year reflected great credit on the Gas Committee and the officials. What did this mean? The cost had been less on account of the increased production; and it was an absolute saving to the city and the consumers of gas. To do anything to prevent this would be a retrogressive step. It was fair to assume that the increase in consumption had been largely due to the reduced price. The proposal of the Committee must inevitably arrest this progress. The result would be, not increased, but reduced, consumption relatively, and consequently higher cost of production. But beside the business side of the question there was the moral side. Much energy had been shown in pushing the use of gas-cookers and gas-fires. People had taken cookers and fires on account of the reduced price—in fact, they had been induced to take them because of the cheap price of gas. Were they going now to say to these people: "We got you to take these things because gas was 2s. per 1000 cubic feet. Now we are going to put your price up to 2s. 4d. It will cost you considerable trouble to get out of it." If the Committee's resolution were carried, a great many gas-stoves would be returned to them; and they would again have to deal with the question of returned gas-stoves. He admitted that the situation was abnormal; but he thought an increase of 2d. would meet the circumstances. The

working classes were prepared to pay what might reasonably be calculated to cover the increased cost; but if they were asked to do more, and provide money for the City Fund, and therefore for the relief of the rates in addition—in other words, to relieve the more wealthy at the expense of the poorest—they would not do it.

Mr. NICHOLSON, who later in the discussion supported the amendment, said he was afraid the majority of the Committee had fallen victims to the temptation of continuing to do as they had done in the past—get through the medium of the gas undertaking something in the nature of a contribution to the City Fund. This was not a proper time to continue the process. The gas undertaking had been little less than a gold mine to the citizens of Carlisle; and he hoped it might continue for many years to be productive. But in principle he was strongly opposed to working undertakings of this sort for what was not their proper function, or the primary object of their establishment, the reduction of the rates.

Mr. B. CARR said that the position seemed to be a very simple one. It had been clearly shown that if the price of gas was continued at 2s. per 1000 feet, the Corporation would be faced at the end of the year with a very serious deficit; and it appeared to be a simple business proposition that they should provide against this by increasing the price of gas accordingly. They had had it shown that even the suggested increase was not likely to meet the case. It surely would be unreasonable not to do as suggested, especially in view of the fact that they were living in uncertain times, and when they did not know what might happen in the course of a year. The probability was that at the end of next year things would be dearer.

Some other members having spoken, the CHAIRMAN replied, the amendment was rejected, and the recommendation of the Gas Committee was adopted.

The Gas-Works Accounts.

The City Treasurer (Mr. John Graham), in his abstract of the income and expenditure of the Council for the year to March 31 last, referring to the gas undertaking, says: The revenue from the sale of gas shows a reduction of £2514, due to the lowering of the price, which came into operation on Jan. 1, 1914. There is also a falling off to the extent of £3181 in the amount of income from residual products. On the expenditure side of the revenue account, decreases are shown under the heads of manufacture (£2472) and public lamps (£1062). The other heads of expenditure show increases as follows: Distribution, £464; rents, rates, &c., £43; management, £306; and various other items, £131. Under the head of management, the item allowances to workmen and officials serving with the army (£360) appears for the first time, and is in accordance with the resolution of the Council. The gross profit for the year is £4128, a reduction of £3363 compared with last year, when the amount of gross profit was £7791. After deduction of instalments of loans and interest and other charges shown in the profit and loss account, the profit remaining is £550.

Mr. Hutchinson's working statement shows that during the twelve months there were used 28,814 tons of coal and 148,389 gallons of oil. The total quantity of gas sold was 348,052,100 cubic feet; while 5,345,900 feet were used for the works and offices, and 20,782,000 feet were unaccounted for. The quantity of carburetted water gas made was 39,572,000 cubic feet.

EDINBURGH AND LEITH CORPORATIONS' GAS SUPPLY.

Accounts of the Department for 1914-15.

Mr. A. Canning Williams, the Treasurer of the Edinburgh and Leith Corporations' Gas Commissioners, on the 22nd ult. presented to the Finance and Law Committee his report on the accounts of the department for the twelve months ending May 15. It was duly passed by the Committee, and came up for confirmation at yesterday's meeting of the Commissioners.

Mr. Williams stated that the gross profit was £85,350, which was £10,242 less than the amount estimated last September—the difference being due to a decrease in income of £8254, and an increase in expenditure of £1988. The charges against net revenue account, including a contribution to the special reserve fund of ½d. per 1000 cubic feet of gas sold, as was proposed in the adopted estimates, amounted to £101,874, or £16,524 in excess of the profit. Deducting from this sum the balance of accumulated surplus revenue brought from 1913-14—£6501—the net deficiency stands at £10,023 [which it has been decided to meet by a draft upon the general reserve fund]. If 2d. per 1000 cubic feet of gas sold had been contributed to the special reserve fund, as heretofore, Mr. Williams points out that the net deficiency would have been £19,343.

The following particulars explain how the difference of £10,242 between the estimated and the actual profit on the year's trading has been brought about:—

INCOME.

	Increases on Estimated Amount.	Decreases on Estimated Amount.
	£	£
Gas		3,070*
Coke		6,055
Tar		3,401
Sulphate of ammonia	3,861	
Other items	411	
	£4,272	£12,526
Deduct increases		4,272
Decrease in income compared with estimate		£8,254

[* Entirely due to restricted public lighting.]

The Main Advance.

THE introduction of the ***New*** Main Cooker marks a great advance in cooker construction. A salient feature is the treble-crowned oven packed with non-conductor which reduces loss of heat to a minimum. There are many other features which will interest you. Send for particulars or, better still, a sample, which will convince you.

R. & A. MAIN, LIMITED.

WORKS: Gothic Works, EDMONTON, N. Gothic Ironworks, FALKIRK; and Gothic Works, BIRMINGHAM.

SHOW-ROOMS AND BRANCHES: 25, Princes Street, Oxford Circus, W.; 136, Renfield Street, GLASGOW; 56, Broad Street, BIRMINGHAM; 83, Old Market Street, BRISTOL; 18, Severn Street, Deansgate, MANCHESTER; 97, Millfield, BELFAST; 333, Queen Street, MELBOURNE; and 12, Cunningham Lane, Pitt Street, SYDNEY, N.S.W.

EXPENDITURE.

	Decreases on Estimated Amount.	Increases on Estimated Amount.
	£	£
Fitting and maintaining cookers, fires, &c.		2,263
Rates and taxes		924*
War service allowances		1,410
Coal, oil, and coke used in manufacture of gas	2,532	
General establishment charges	610	
Bad debts	187	
Other items		720
	£3,329	£5,317
Deduct decreases		3,329
Increase in expenditure compared with estimate		£1,988
Decrease in income on estimated amount		£8,254
Increase in expenditure on estimated amount		1,988
Total		£10,242

[* Increase in rate of income-tax.]

SALE OF GAS.

During the year 1,988,328,500 cubic feet of gas were sold—the largest quantity in any year except 1913-14, when it was 30,913,200 cubic feet higher. If it had not been for the greatly restricted public lighting, due to military precautions, which effected a reduction of consumption by the public lamps of 31,971,800 cubic feet—a decrease of 38·29 per cent. on the previous year—there would have been a slight increase in the sale of gas.

The following table gives further details as to the sale of gas:

—	Year 1914-15.	Year 1913-14.	Increase (+) or Decrease (−).	—
	Cubic Feet.	Cubic Feet.	Cubic Feet.	Per Cent.
Ordinary consumers	1,649,077,700	1,660,947,700	− 11,870,000	− 0·71
Engines, &c.	120,411,500	114,411,600	+ 5,999,900	+ 5·24
Prepayment consumers	97,884,500	91,180,600	+ 6,703,900	+ 7·35
Stair lights	66,399,700	66,843,600	− 443,900	− 0·66
Public lamps	51,519,600	83,491,400	− 31,971,800	− 38·29
In bulk	3,035,500	2,366,800	+ 668,700	+ 28·25
Totals	1,988,328,500	2,019,241,700	− 30,913,200	− 1·53

INCOME AND EXPENDITURE COMPARED WITH 1913-14.

Dealing with the heads of income and expenditure for the year 1914-15, and comparing them with the year 1913-14, the following differences are shown.

INCOME.

	Amount for 1914-15.		Increase (+) or Decrease (−) on 1913-14.
Gas	£259,174	..	−£3,183
Coke	30,062	..	−7,094
Tar	15,269	..	−6,216
Sulphate of ammonia	23,371	..	−229
Rent of gas-fires, &c.	2,397	..	+661
Prepayment consumers (extra charge)	2,854	..	+186
Stair lights (maintenance, &c.)	4,582	..	−50
Other items	4,249	..	−149
Total income	£341,958	..	−£16,074

EXPENDITURE.

Coal	£118,350	..	−£13,044
Oil, &c., for carburetted water gas	3,003	..	+2,129
Wages (carbonizing)	12,159	..	−660
Salaries of engineers, works' staff, &c.	13,230	..	−36
Purification	716	..	−295
Repairs, &c., of works and plant	24,129	..	−2,095
Wages of gas-fitters, &c.	10,891	..	−646
Repairing mains, services, and meters	8,172	..	−760
Maintenance of stair lights	3,651	..	+5
Fitting and maintenance of cookers, fires, &c.	15,263	..	+288
Salaries—Treasurer and collectors' department, surveyors, &c.	13,326	..	−21
Establishment charges	4,490	..	−494
Rates, taxes, &c.	19,655	..	−2,932
Superannuation fund, national insurance, &c.	4,970	..	−81
War service allowances	4,010	..	+4,010
Bad debts	363	..	−172
Other items	229	..	+91
Total expenditure	£256,607	..	−£14,713
Charges for annuities, mortgage interest, &c., and contributions to the sinking and general reserve funds	£94,625	..	+£664
Contribution to special reserve fund (¾d. per 1000 cubic feet of gas sold, as compared with 2d. in 1913-14)	7,249	..	−9,578
	£101,874	..	−£8,914
Balance between income and expenditure, being gross profit for the year	85,350	..	−1,361
Deficiency on year's working	£16,524	..	−£7,553
Deduct surplus revenue forward	6,501		

Net deficiency £10,023, leaving, in addition, £9320 due to the special reserve fund, to be made up in the period ending May 15, 1919.

"Carrying On"

Over **500** of our Works Employees are now absent on Military Service.

Of those who remain, many are engaged, directly or indirectly, in making Munitions of War.

Despite these heavy first claims, we can still execute your orders. Our stocks are ample, and our efficiency as an organization unimpaired.

The Gas Exhibition Salons,
60, Oxford Street, London, W.

THE DAVIS GAS STOVE CO. LTD.

Capital Account and Redemption of Debt.

The following sums were last year charged to capital account: Railway waggons, £11,066; cookers and fires, £2068; new additional meters, £1330; new additional mains and services, £600 · total £15,064. The amount received for the site, &c., of the old gas-works at Leith (£13,000) has been deducted from the capital expenditure—the net addition, therefore, for the year being only £2064.

Annuities and mortgages amounting to £36,754 were redeemed during the year, leaving the outstanding annuity and loan capital at £1,771,097, as compared with £1,806,175 at May 15, 1914. Included in the £36,754 is £19,654, the capitalized value of annuities purchased at a cost of £17,720, or £1934 below the compulsory purchase price.

General Reserve Fund.

This fund has been increased from £43,517 at May 15, 1914, to £46,106 at May last. It consists of compulsory contributions under the 1902 Act amounting, with interest, to £14,684, and voluntary contributions out of surplus profits in past years, with interest, £31,422.

CHARLOTTENBURG CORPORATION GAS-WORKS.

The Last Report Issued.

The report on the working of the Charlottenburg Corporation Gas-Works for the financial year 1913 was published in a recent number of the "Journal für Gasbeleuchtung."

The quantity of gas made in 1913 was 59,374,300 cubic metres (2097 million cubic feet), which was a decrease of 0·99 per cent. on the production in 1912. The result of this decrease was that the net profit of the undertaking for the year was 11·14 per cent. below the estimate. The chief causes of the decreased consumption were general stagnation in industry, and the prevalence of good bright weather extending into the winter months. The daytime consumption—from 6 o'clock in the morning till 6 o'clock in the evening—for the year showed an increase of 5·72 per cent. over the daytime consumption in 1912. The falling-off in consumption was only in the evening and night hours in the winter half of the year. There was a decrease of 1·69 per cent. in the consumption by private consumers, though the number of consumers increased by 5·30 per cent. The number of prepayment meters grew during the year from 20,337 to 23,071; but the mean consumption of gas per meter of this class exhibited a slight falling-off.

Of the total production of gas, 5·6 per cent. was coal gas produced at the No. 1 gas-works, 91·6 per cent. coal gas produced at the No. 2 gas-works, and 2·8 per cent. water gas, also produced at the latter works. The gas consumption was distributed as follows: Private consumers 86·28 per cent., municipal buildings 1·20 per cent., public lighting 7·86 per cent., works consumption 0·96 per cent., unaccounted for 3·70 per cent. Tests showed that the gas was well purified throughout the year, and had an average illuminating power of 13·41 candles, and a gross calorific value of 584 B.Th.U. per cubic foot at 60° Fahr., 30 inches, and saturated.

The dry coke had a mean calorific value of 12,c82 B.Th.U. per pound. The tar sold was guaranteed not to contain more than 3 per cent. of water; and the guarantee was amply fulfilled. The sulphate of ammonia was sold as containing 25 per cent. of ammonia and less than 0·4 per cent. of free acid. Actually towards the end of the year it contained only 0·1 per cent. of free acid. The demand for better quality salt was therefore met without difficulty. Concentrated liquor was no longer in demand, owing to the appearance on the market of artificial ammonia; and the stock of concentrated liquor was worked up to sulphate.

STRATFORD-ON-AVON GAS UNDERTAKING.

At their meeting on Tuesday of last week, the Stratford Town Council had before them the question of the proposed loan in connection with the gas undertaking. The Chairman of the Gas Committee reported that he had visited the Local Government Board offices with the Town Clerk and the Gas Manager on the subject of the proposed loans; but that it was certain the Board would not now grant loans for the objects before them. The Chairman also reported that, although the Board would give no definite promise of a loan for the retorts after the war, he believed they would not refuse it, on the grounds that the work would then have been carried out. The Committee recommended the Council to agree with Messrs. W. C. Holmes and Co. to erect and finish the retorts and carry out the other necessary work "on the lines of the minutes of May 17, 1915." In the minutes referred to, the Gas Committee decided to approach the Local Government Board and endeavour to get them to promise their sanction for the proposed loan after the war if Messrs. Holmes would do the necessary work at once, and charge a rental until the loan was sanctioned.

Mr. Everard, in moving the adoption of the recommendation, said the instructions of the Local Government Board were pretty imperative that no loans could be granted. They tried very hard to get an undertaking that their action, if they went on building, should not prejudice an application later on. They did not elicit any refusal or statement that it would not be granted, but they could not get the officials to say that they might go on. The impression left on their minds was that it would not prejudice their application later on through having done work before getting the consent of the Board. Further, they learned that the Board would not lend money on the retorts for a longer period than fifteen years, although possibly they could get twenty years on some parts. The bulk of the Committee thought they were absolutely right in going on with the matter and coming to terms with Messrs. Holmes. His feeling was that the firm had met them quite fairly in the matter.

The recommendation was agreed to.

Perfect NOISELESS Combustion.

Pouring in an excessive quantity of grit.
It will be seen that the moment the hand has passed on to the next teat the flames become exactly as before.

WRIGHT'S PATENT
"THIMBLE"
GAS-FIRE
BURNER.

Adjustable for pressure.
Adjustable for calorific value, &c.
Non-luminous under all conditions.

These improvements are embodied in all our New Season's Fires without extra charge.

John Wright & Co.,
Essex Works,
Birmingham.

Sectional View of Patent "Thimble."
In actual test, even when the thimble was filled with grit up to the point shown in the above illustration, the full quantity of gas continued to pass, and the flame-quality was unimpaired.

NOTES FROM SCOTLAND.

From Our Own Correspondents.

Saturday.

At Wednesday's meeting of the Dundee Gas Commission, the report made by Mr. Alex. Yuill [see *ante*, p. 146] in regard to the Broughty Ferry Gas-Works, was referred to. It will be remembered that when the estimates for the current year were considered, the lack of what was thought to be sufficient provision for depreciation in connection with the works, now superseded, was spoken of; and Mr. Yuill was asked to submit a report. Mr. Crichton said the report covered all the points raised by him, and was very satisfactory. It was a pity, however, that the information had not been supplied earlier. Mr. Noble, the Convener of the Gas Committee, agreed, and promised that next year he would institute a new procedure altogether. He was determined that the accounts would come before the Commissioners as a Gas Committee before the Finance Committee or the meeting of the Commissioners. Bailie Barnes considered the report a complete vindication of the action of the Manager in the preparation of the estimates. He associated himself with what Mr. Crichton had said—remarking that the members should have an opportunity of discussing the estimates at the proper time.

The price of gas is to be raised in Forfar by 5d. per 1000 cubic feet. The financial position was under consideration at a meeting of the Town Council on Wednesday, when Mr. Lamb, the Convener of the Gas Committee, stated that the expenditure for the current year was estimated at £12,691. The revenue from residual products would likely be £3494; and they estimated that with the price at 3s. 3d. per 1000 cubic feet they would derive an additional revenue of £9100. This showed an apparent deficit of £96; but they expected to have a balance of about £500 from last year. Satisfaction was expressed that Forfar was able to get off with such a small advance.

At Wednesday's annual meeting of the Montrose Gaslight Company, Mr. James Mitchell, the Manager of the works, reported that the gas made during the past year was 42,356,600 cubic feet – an increase of 1,085,400 cubic feet, or 2·63 per cent., over the previous year's make. The gas sold showed an increase of 4·05 per cent. on the quantity sold last year. The same dividend was declared as at the 1914 meeting; and the Chairman (Mr. A. Muirden) indicated that owing to a large advance in coal prices, and the anticipated reduced returns from residuals, the price of gas to consumers would eventually require to be raised in the town, as elsewhere.

The Hawick Gaslight Company are paying a dividend for the past year of 5 per cent. The price of gas is fixed at 3s. 2½d. per 1000 cubic feet—an increase of 11d. For the past year there had been the record make of gas of over 100 million cubic feet.

At a meeting of the Dundee Trades Council on Wednesday, the question of the price charged for gas consumed through penny-in-the-slot meters before April 30 last was discussed; and it was held that to charge on the new rate before it had been formally fixed by the Town Council was illegal. The matter was brought up by the Convener of the Local Affairs Committee, who read a letter from the Town Clerk, in which it was stated that he was of opinion that the increased rate should only apply to gas consumed after April 30. The Town Clerk further expressed the opinion that there should be no collection taken between April 30 and the date of the statutory meeting of the Gas Commissioners. The Convener said his reading of the Town Clerk's letter was that collections at the new rate were illegal before the statutory meeting had fixed the rate. The only just and legal thing the Council could do was to charge from May 1 to the next collection at the new rate, and from the previous collection to May 1 at the old rate. Mr. Ross pointed out that it was obvious that the Council had taken from the working classes who used penny-in-the-slot meters more than they were entitled to; and he moved that they claim a rebate on gas consumed before April 30. The motion was unanimously adopted; it being further agreed to ask all persons who had been overcharged to retain their receipts.

CURRENT SALES OF GAS PRODUCTS.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *July 26.*

There have again been several inquiries in the market for pitch to be exported next season. With regard to creosote, it may be clearly said, for the information of tar producers, that for a long time past record prices have been obtained both for use in America and in this country. Freights paid on this article have been comparatively reasonable; and a few weeks ago it was reported that 4½d. net per gallon in bulk at makers' works London had been realized, while America continues to be an urgent buyer. Naphthalene and other materials for dye-making are in great demand. Average quotations are as follows (but some of the products having been requisitioned by the Crown authorities are not obtainable on the market): Benzol, 1s. 2d.; toluol, 3s. 4½d.; solvent naphtha, 2s., each net per gallon in bulk at makers' works; 60's crude carbolic acid, 3s. 6d. to 3s. 7½d. net, casks free; heavy oil, 4½d. to 4¾d. net and naked; creosote, 4¼d. net in bulk; anthracene, 40 to 50 per cent., 2¼d. net per unit packages free; pitch, 26s. net in bulk.

Sulphate of ammonia remains in a firm position, but sellers are scarce. The price is unaltered at £14 8s. 9d. net per ton, filled into buyer's bags at makers' works, for minimum 25 per cent. quality.

Tar Products in the Provinces.

July 26.

The markets for tar products have continued steady. In pitch, there is little or no business doing at the present moment. Freights are very uncertain, and therefore make transactions difficult. However, the

majority of distillers are firm in their idea of value. Solvent and heavy naphthas are in good demand, and high prices are being paid. Creosote is quiet, and sales are reported at very reasonable figures.

The average values of gas-works products during the past week were: Gas-works coal tar, 21s. 6d. to 25s. 6d. Pitch, East Coast, 22s. to 23s. per ton; Norfolk, Suffolk, and Humber ports, 19s. to 20s.; West Coast, 20s. to 21s. Manchester; 21s. to 21s. 6d. Liverpool; 23s. to 24s. Clyde. Benzol, 90 per cent., naked, North, 10¼d. to 11d.; 50-90 per cent., naked, North, 1s. 3d. to 1s. 4d. Toluol, naked, North, 2s. 2d. to 2s. 4d. Crude naphtha, in bulk, North, 6d. to 6½d. Solvent naphtha, naked, North, 1s. 10d. to 1s. 11d. Heavy naphtha, naked, North, 1s. 2d. to 1s. 3d. Creosote, in bulk, North, 3d. to 3 1/16d. Heavy oils, in bulk, 3 7/8d. to 4d. Carbolic acid, casks included, 60 per cent., East and West Coasts, 3s. 6d. Naphthalene, £8 to £16; salts, 75s. to 80s., bags included. Anthracene, "A" quality, 2d. per unit; "B" quality, nominally ¾d.

Sulphate of Ammonia in the Provinces.

LIVERPOOL, *July* 24.

No change has taken place either in the tone of the market or in the value of this article during the past week. All near requirements have apparently been covered, and foreign buyers have been inclined to await further developments before making additional contracts, but, on the other hand, there has not been any pressure on the part of producers to effect sales. The closing quotations are still £14 13s. 9d. per ton f.o.b. Hull, £14 16s. 3d. f.o.b. Liverpool, and £15 1s. 3d. f.o.b. Leith. In the forward position little actual business has transpired, and the prices for October-March delivery remain £15 2s. 6d. f.o.b. Liverpool, and £15 5s. per ton f.o.b. Leith.

Nitrate of Soda.

The market for this material is also without alteration, and quotations are repeated at 12s. 3d. per cwt. for ordinary quality, and 12s. 6d. for refined, on spot.

Sulphate of Ammonia.

From another source it is stated that this market has remained firm during the past week, and further business is reported for delivery well into the next year. Outside London, makes are quoted at £13 15s.; Hull, £14 15s.; Liverpool, £14 17s. 6d.; Leith, £15; Middlesbrough, £14 15s.

The Wombwell District Council have decided to charge a rent sufficient to cover the loss on capital outlay for meters and fittings to all consumers using gas solely as a stand-by for electric current. The Gas Committee have recommended the Council to become subscribers to the British Commercial Gas Association.

COAL TRADE REPORT.

Northern Coal Trade.

The northern coal trade is generally steady, though prospective legislation limits forward dealings. In the steam coal trade, the demand is good for the higher qualities, and a little stronger for secondary kinds. For best Northumbrians, 21s. to 21s. 6d. per ton f.o.b. is the current quotation; and for second-class steams, from 16s. 6d. to 17s. per ton. Steam smalls are in rather fuller demand. The prices, therefore, show a little ease, and are from 13s. to 14s. per ton. Production seems somewhat better; but the output is well taken up, and some collieries have fair forward contracts. In the gas coal trade, deliveries are heavy on long contracts, so that the bulk of the output is thus readily taken up—the home consumption being now better met than it was a few weeks ago. Best Durham gas coals are from 20s. to 20s. 6d. per ton f.o.b.; second-class sorts are about 16s. to 17s. per ton; and for "Wear Specials," 21s. per ton f.o.b. is quoted. There are no new contracts reported of late; and this is not surprising in the face of possible changes in price, and also in the shipment of coals to neutral countries. The freight market is quieter, and gas coals from the Tyne to London are now fixed at 7s. per ton or very slightly over. This rate seems likely at present to continue, though suitable vessels are in good demand for the coasting trades generally, and it will be remembered that deliveries on the old contracts must be soon expected to increase. Coke is steady. Gas coke is in general retaining the higher price recently gained. Good gas coke is quoted at 27s. to 28s. per ton f.o.b. in the Tyne.

Mansfield Water Undertaking.—The annual report of the Water Committee, presented at a meeting of the Mansfield Town Council on Friday week, showed a total income for the year of £13,352, compared with £13,338 in the previous twelve months; the expenditure, apart from dividends, interest, and sinking fund, having been £5725, compared with £4934. The gross profit amounted to £7626, against £8403. After payment of interest, &c., there remained a net profit of £2498, of which £2000 has been applied in relief of the district rate; the remainder being placed to the reserve fund.

Belfast Water Supply.—A report on the subject of the water supply furnished to the City and District Water Commissioners stated that the additional storage works provided at Lough Mourne reservoir gives 127 million gallons; that the enlargement of South Woodburn reservoir will give an additional 90 million gallons; that Lough Shannagh gives an additional 80 million gallons, and that a further 12½ million gallons are being provided for—the whole yielding an increased storage since 1911 of 309½ million gallons. The Belfast Rural District Council have appointed a Committee to investigate, with Mr. W. D. R. Taggart, the alleged insufficiency of the water supply in the Carnmoney district, embracing an important residential area overlooking Belfast Lough.

Epoch —

A fixed point or period of time remarkable for some great event or series of events from which succeeding years, as connected therewith, are numbered; any remarkable date.

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Tottenham Light and Power Company.

The report of the Directors for the half year ended June 30, to be presented to the proprietors at the annual ordinary general meeting, to be held next Saturday week, states that the accounts for the six months show that, after providing for interest charges, there remains a profit balance of £14,610. Adding the amount brought forward from the previous half year, £25,561, the sum available for distribution is £40,171. The Directors recommend payment of the 5 per cent. per annum dividend on the preference stock, and of the full statutory dividends of 7½ per cent. per annum on the "A" stock and 6 per cent. per annum on the "B" stock, which will absorb £25,490 and leave £14,680 to be carried forward. The sales of gas showed an increase of 1½ per cent. over those of the corresponding six months of 1914. The consumers of the Company's gas now number 79,654, and the cooking and heating stoves in use are 57,169. In February last, £40,000 of the Company's "B" stock was offered for sale by tender, and realized an average price of £112 16s. 9d. To meet the greatly increased cost of coal, and the many extra charges which fall upon the Company in consequence of the war, the Directors have been obliged, with much regret, to increase the price of gas by 3d. per 1000 cubic feet, from the reading of the meters at Midsummer.

Gas Lighting at Lambeth.

The Lighting Committee of the Lambeth Borough Council have considered the accounts of the Gas Light and Coke Company, the South Metropolitan Gas Company, and the South Suburban Gas Company for public lighting during the quarter ended June 30 last, and have referred them to the Finance Committee for report and payment. The Gas Light and Coke Company's account totals to £528, from which amount the Company make an allowance of £21 in respect of gas not supplied in consequence of compliance with orders for diminishing the street lighting. The South Metropolitan Gas Company's account amounts to £2930, from which the Company have allowed, in respect of modified lighting, the sum of £897. The South Suburban Gas Company's account amounts to £190, from which a deduction of £27 is made by the Company for gas unconsumed as the result of the modification in street lighting. The Committee add that the accounts of the South Metropolitan Gas Company and the South Suburban Gas Company, exclusive of the deductions for modified lighting, have been increased by £405 and £20 respectively over the amount of the accounts for the corresponding period of last year, in consequence of the rise in the price of gas; but no such increase has been made by the Gas Light and Coke Company, owing to the fact that this Company's charges for the supply of gas are covered by the contract with the Council.

The Berwick and Tweedmouth Gas Company have agreed to a dividend of 8 per cent. (less income-tax), in place of the 10 per cent. to which the shareholders had become accustomed.

Darwen Gas and Water Accounts.

Mr. S. Crook, the Borough Treasurer of Darwen, has issued an abstract of the accounts of the Corporation, in the course of which he points out that the Gas Department has felt the results of the war in a large measure. The department commenced the year with an undivided profit of £5387; and on the framing of the estimates for the general district rate in the early part of the year, it was decided to transfer £1500 of these profits in aid of the general district rate. The result of the year's working was a loss of £2090, instead of a customary profit. They had made provision to the extent of £1584 for works supplanted on the erection of new gas apparatus, and on which the sinking fund contributions had not been completed. These items deducted, there remained only £212 of disposable profits to carry forward to the current year. Faced with the heavy increase in the price of coal, heavier sinking fund and interest charges in connection with the new plant, and increased prices of materials, the Gas Committee were reluctantly compelled to raise the price of gas. Mortgage indebtedness had been extinguished to the extent of £5700. In the Water Department, the rental receipts amounted to £12,752. The receipts for the previous year amounted to £12,715. The largest item on the expenditure side of the accounts was for water supplied by Bolton, £2847.

Hoylake and West Kirby Gas and Water Company.

The report of the Directors and the accounts for the year ending June 30 (which will be submitted at the thirty-eighth ordinary general meeting of the Company) show that the balance at the credit of profit and loss, after payment of the dividends and transfers to renewals and reserve funds, in respect of the year to June, 1914, is £1606, to which has to be added the net revenue for the past twelve months, £6681, and £1600 transferred from the gas contingency and plant renewal fund—making a total of £9887. Deducting the interim dividend paid in January (£2599), there is available a sum of £7288. From this, the Board recommend the payment of the following dividends: 6 per cent. on the "A" gas original capital; 4⅛ per cent. on the "B" gas additional capital; 6 per cent. on the "A" water original capital; and 4⅛ per cent. on the "B" water additional capital. These will absorb £3899, and leave a balance of £3389. After transferring £225 to the water contingency and plant renewal fund, there is left £3163 to carry forward. The dividend scheme, together with the interim dividend paid in January, represents a total distribution, less income-tax, for the year of 10 and 7 per cent. on the "A" and "B" capitals respectively. The quantity of gas supplied last year to private consumers and to the public lamps was 67,447,000 cubic feet. The price of gas during the period under review was 3s. 4d. per 1000 cubic feet, less varying discounts; while the charge to users of prepayment meters was 4s. 2d.

Half-yearly dividends at the rate of 5 per cent. per annum on the preference shares and £7 7s. per annum on the ordinary shares are being paid by the Annfield Plain and District Gas Company.

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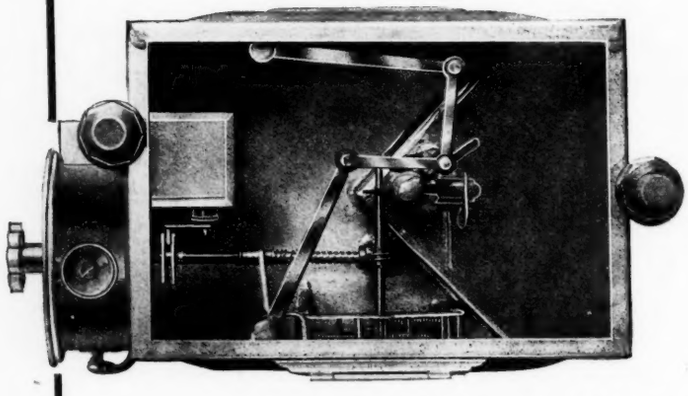

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Morecambe Price to Remain Unchanged.—The year's accounts of the Morecambe Gas Department show a credit balance of £1096, as compared with £1344 last year. Of this amount, £684 will be spent in renewals, and £412 placed to the relief of the rates. There has been an increase in the production of gas of 5 million cubic feet. The Gas Committee do not contemplate increasing the price.

John Russell and Co., Limited.—A Company has been registered, with a capital of £200,500 in £1 shares, 150,000 of which are 6 per cent. preference shares, to take over the business of John Russell and Co., Limited (incorporated in 1876), to carry on the business of tube manufacturers, factors, and merchants, coalmasters, ironmasters, dealers in gas, steam, locomotive, hydraulic, metallic, and other tubes, gas and other fittings, chandeliers, gaseliers, and other articles, &c., and to adopt an agreement with the old Company.

Oldham Street-Box Explosions.—In view of recent explosions in Oldham streets, owing to the proximity of gas and electric mains at certain points, a scheme has been proposed for placing the gas-pipes and electric cables farther apart. To obtain an idea of the cost, it is suggested that a length of 40 or 50 yards be taken up and altered. The cost of the work will then be allocated between the two departments. The Gas Committee, when the matter was brought before them, felt that for the public safety the work would have to be done, and authorized the experiment. The Electricity Committee subsequently gave instructions for the drawing-up of a report, and, if thought advisable, for the alteration of a short length of cable, so as to get an estimate of the cost.

Ashton-in-Makerfield Manager Complimented.—At the last meeting of the Ashton-in-Makerfield District Council, it was reported by the Gas and Lighting Committee that, in face of greatly increased expenditure, they were able to recommend that the price of gas remain unchanged. The value of this to the consumer, said Mr. J. Roberts, would easily be realized, when it was pointed out that the price of coal had doubled since 1911-12. Though the price of other materials also had increased since that time, they had had a steadily growing profit; and for the year ending March last the profit was the largest ever made. All credit was due to their Manager (Mr. H. Burton), for his wise and practical suggestions in the present crisis, and for the satisfactory condition of his department.

No Increase in Price at Colwyn Bay.—Alluding to the minutes of the Lighting Committee at the monthly meeting of the Colwyn Bay Urban District Council, which showed that on the past year's working there was a deficiency of £37, Mr. Gamble pointed out that various items which might have been allocated to capital account had been charged to revenue. Otherwise, there would have been a profit. The Committee did not propose to make any increase in the price of gas, though coal for the present year was costing 6s. a ton more than it did last year. Mr. G. Bevan (Chairman of the Finance Committee) congratulated Mr. Gamble upon the statement, and said they were looking forward to the time when the increasing revenues of the Gas Department would ease the burdens of the "poor ratepayer."

Bland Light Syndicate, Limited.—At the Board meeting of the Syndicate held on the 16th inst., it was decided to declare an interim dividend at the rate of 6 per cent. per annum, as last year. The Chairman (Mr. F. J. Gould) said he was very pleased to report that, although the turnover was slightly decreased, economies had been effected which enabled them to maintain the net profit, and there was every prospect of a satisfactory year.

Synthetic Chemicals, Limited.—This is the title of a Company which has been registered with a nominal capital of £2500, in 2100 "A" and 400 "B" shares of £1 each. The objects are to manufacture dyes, including coal-tar dyes, and chemical substances of all kinds, and to adopt an agreement between W. G. Wilkins, A. J. Walker, P. E. Bowles, Oliver Wilkins and Co., Limited, and T. S. Jones (for the Company). The Company is a private one.

Charges for Reinstating Pavements.—Consequent upon the enhanced price of materials, such as cement, the Metropolitan Water Board have intimated to the Stepney Borough Council that they are prepared to allow an increase of 10 per cent. on the existing schedule of charges for the reinstatement of trenches opened by the Board within the borough—such increase to take effect from April 1 last. In view of the possibility of a further increase in the price of materials, the Council have deemed it advisable to limit the proposed agreement to six months; and the Water Board have been so informed.

Chislehurst Street Lighting.—The Works Committee of the Chislehurst Urban District Council do not consider that any useful purpose would be gained by turning out the street-lamps at an earlier hour than usual. In this connection, the Committee reported, at a meeting of the Council last week, that they had considered a communication suggesting the total extinction of the street-lamps; but having regard to the opinion expressed by the Admiralty (who have made numerous investigations on the subject), that such a course is most undesirable, they had come to the conclusion that it would be more satisfactory to continue the reduced lighting till further directions were issued by the proper authorities. The report was adopted.

Street Lighting at Northampton.—The Northampton Highways Committee have received a letter from the Gas Company regarding public lighting during the continuance of the war. The Company point out that owing to the restricted lighting brought about (some 700 lamps are not now lighted, but still require a certain amount of maintenance), and to the fact that the number of lamps at present in use only allows of the reduction of their staff by four lamp-lighters, the cost per lamp has been greatly increased. They are, however, prepared to continue their contract during the period of the war at the rate of £2 15s. 4d. per annum per ordinary lamp; these figures being based on the present price of gas and the number of hours of lighting. Should the price of gas be increased, the calculations are to be made on the consumption, and charged at such increase (less 10 per cent. discount). The Committee have decided to recommend the Council to accept the Company's offer, which they state will effect a saving at the rate of about £2575 per annum on the terms of the old contract.

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Gas-Meter Thefts in Ireland.—In the Dublin Northern Police Court, John Patterson was sent for trial at the City Commission on charges of burglariously entering houses in Leeson Park, and stealing money from, and damaging, a gas-meter. Inspector Bergin, of the Alliance and Dublin Consumers' Gas Company, stated that in all 7s. 3d. was taken, and that the damage done amounted to 9s. The Belfast Magistrates sentenced John M'Millan to two months' imprisonment for stealing 1s. 3d. from a Corporation gas-meter in a house in Ewart's Row, and for maliciously damaging the meter.

Glass from Denmark.—The issue of "The Times" for Friday last contained a letter on the above subject from Mr. Charles D. White, in which he says: A few days ago, being in immediate need of a lamp chimney, I was forced personally to go into the village to buy it. On the glass of the chimney I read: "Made in Denmark." I said to the shopkeeper: "Do you think that chimney was made in Denmark?" To this he replied that he had his suspicions, that he had handled German chimneys before the war, and that this one was in every respect identical with the German ones. He produced a German chimney—the only one he had left of his ante-war stock. The two chimneys were, in fact, identical, except for the word "Saxony" on the one and "Denmark" on the other; and even in this they were alike, as these words were stamped on the very same part of the glass, within a circle of precisely the same size, on both chimneys. Inside the circles the words were distributed so exactly in the same manner that it was evident the word "Denmark" had been substituted for the word "Saxony" in the die or instrument used for stamping the chimneys. Having lived in Denmark, knowing fairly its industries, never before having seen a Danish-made lamp chimney—so far as I can recall, not even in Denmark itself—and observing such perfect identity in the two chimneys, I am of the opinion that Germany is by this alteration of label securing an outlet for this article of export. The ironmonger quite agreed with me in this opinion. Can you, or anyone, prove to me that my conjecture is incorrect?

Nuneaton's New Water-Mains.—The Nuneaton Town Council have had before them a letter from the Local Government Board, with reference to an application for a loan of £2000 for the purpose of laying new water-mains, stating that at the present time money could not be sanctioned for this kind of work, unless it could be shown that it directly affected the public health or was for war purposes. The Council decided to adjourn the matter for three months.

Water Supply of Oldham.—New filtration works, erected at a cost of £20,000, and estimated to give an additional 90 million gallons of water annually to Oldham, were formally opened at Castleshaw last week by Alderman Greaves (the Chairman of the Water Committee). The scheme will permit the use of a quantity of flood water now allowed to run to waste. The plant is capable of filtering 140,000 gallons per hour, or a total of 3,360,000 gallons a day, and when working at its fullest capacity will filter 122 gallons per hour per square foot of filter.

The Bradford Corporation Gas Committee have appointed a Special Sub-Committee with power to renew any of the existing contracts for gas coal at prices in accordance with those to be permitted under the impending Act of Parliament, and to consider and make recommendations as to tenders to be obtained for the annual supplies of coal, &c.

Early in April, a labourer (65 years of age) at the Dukinfield Corporation Gas-Works, slipped while emptying a barrow-load of oxide into a purifier, and fell with his head against the side of the box. This caused a wound on the temple, which was dressed, and the man was sent to the hospital, where he remained a month, and then became an out-patient. On the 6th inst. he died; and a postmortem examination showed that death was due to natural causes, and was not in any way accelerated by the injury sustained at the gas-works. The Coroner observed that if there had not been this postmortem examination, it might have been said that death was owing to the accident.

GAS COMPANIES IN THE STOCK EXCHANGE.

The general position of affairs on the Stock Exchange last week was much the same as the week before; but the paucity of business was even more pronounced. The tone, however, was more gratifying. After a rather dull opening day, the feeling slowly but steadily improved; and before the conclusion of business on Friday (for the Exchange was closed on Saturday), the prevailing disposition was one of cheerfulness. The old War Loan made an appreciable recovery, in response to inquiries by buyers, and Home Rails improved in view of the cessation of the South Wales strike—an advance which was maintained later on when a batch of railway dividends were announced, nearly all of which came up to expectations. The allotments of new War Loan paid-up in full on Tuesday reached a huge figure. Some had expected that, with the closing of the Bank of England list of subscribers, dealings in the loan would be at once authorized. But, seeing the unworkability of this so long as the Post Offices remained open to applicants, the postponement of dealings became a necessity. Business in the Gas Market was quieter than ever, even after making allowance for a five-day week. The small array of prices marked showed no change from the week before. The first announcements of companies' figures for the half year ending June 30 have appeared. The Gas Light and Coke Company will pay the full statutory dividend at the rate of £4 4s. per cent., and will carry forward a balance higher by £50,000 than that of six months ago. The Tottenham District Company will pay full statutory dividends of 7½ and 6 per cent.—as last year. The Newcastle Company will pay an interim dividend of 4½ per cent. The Money Market was strong and active by reason of War Loan requirements, and discount rates generally were firm.

Bargains done for cash during the week were as follows: On Monday, Gas Light ordinary 80, 80½, 81, Lea Bridge 95, South Metropolitan 83, ditto debenture 59, 59½, 60, Tottenham "B" 103½, 104. On Tuesday, Alliance and Dublin 62, South Metropolitan 83, South Suburban debenture 90. On Wednesday, Bombay 5 7/32, Gas Light ordinary 80, 80½, ditto preference 71, South Metropolitan 82½, 83, 83½, 83¾, South Suburban debenture 90½. On Thursday, European 12½, Gas Light ordinary 80¾, 81¼, South Metropolitan 82¼, 82½, 84. On Friday, Commercial 4 per cent. 91½, European 12⅜, 12½, Gas Light ordinary 80½, 81.

Bank rate (fixed Aug. 8), 5 per cent.; last year, 3 per cent.

LOWEST AND HIGHEST PRICES OF BARGAINS DONE FOR CASH IN THE WEEK ENDING JULY 24.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d.	
1,551,868	Stk.	April 8	2½	Alliance & Dublin Ord.	59—64	3 18 2	62
374,000	,,	July 10	4	Do. 4 p.c. Deb.	76—79	5 1 3	..
280,000	5	April 29	7½	Bombay, Ltd.	5 7/32—6⅜	5 17 8	5 7/32
50,030	10	Feb. 26	16	Bournemouth Gas and Water — 10 p.c.	29—30	5 6 8	..
873,480	10	,,	7	Bournemouth Gas and Water — B 7 p.c.	15—15½	4 10 4	..
95,000	10	,,	6	Bournemouth Gas and Water — Pref. 6 p.c.	13½—14	4 5 9	..
—	—	—	—	Bournemouth Gas and Water — Deb.	..	—	..
880,000	Stk.	Feb. 26	14	Brentford Consolidated	261—266	5 5 3	..
330,000	,,	,,	11	Do. New	204—209	5 5 3	..
50,000	,,	,,	5	Do. 5 p.c. Pref.	109—111	4 10 1	..
206,250	,,	June 11	4	Do. 4 p.c. Deb.	91—93	4 6 0	..
217,380	Stk.	Feb. 26	11	Brighton & Hove Orig.	208—213	5 3 4	..
244,300	,,	,,	8	Do. A Ord. Stk.	154—159	5 0 8	..
630,000	20	Mar. 26	12½	British	44—45	5 11 1	..
130,000	Stk.	June 26	4	Do. 4 p.c. Deb. Stk.	88—90	4 8 11	..
345,771	Stk.	June 26	4	Buenos Ayres 4 p.c. Deb.	85—87	4 12 0	..
100,000	10	—	—	Cape Town & Dis., Ltd.	1¼—2½	—	..
100,000	10	—	—	Do. 4½ p.c. Pref.	4—6	—	..
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	70—75	6 0 0	..
157,150	Stk.	Feb. 26	5	Chester 5 p.c. Ord.	108—110	4 10 11	..
1,513,280	Stk.	Feb. 12	5/9/4	Commercial 4 p.c. Stk.	106—108	5 1 2	91½
560,000	,,	,,	5½	Do. 3½ p.c. do.	103—105	5 1 6	..
475,000	,,	June 11	3	Do. 3 p.c. Deb. Stk.	69½—71½	4 3 11	..
900,000	Stk.	,,	4	Continental Union, Ltd.	76—79	5 1 3	..
200,000	,,	,,	7	Do. 7 p.c. Pref.	115—118	5 18 8	..
—	—	—	—	Croydon B and C 7 p.c.	..	—	..
492,370	Stk.	—	6	Derby Con. Stk.	123—125	4 16 0	..
55,000	,,	—	4	Do. Deb. Stk.	102—104	3 16 11	..
1,002,180	10	July 29	10	European, Ltd.	17½—18	5 11 1	12⅝—12½
16,362,910	Stk.	Feb. 12	4/17/4	Gas Light and Coke — 4 p.c. Ord.	98—102	4 15 6	80—81½
2,600,000	,,	,,	8½	Gas Light and Coke — 3½ p.c. max.	76—79	4 8 7	..
4,062,235	,,	,,	4	Gas Light and Coke — 4 p.c. Con. Pref.	96—99	4 0 10	71
4,674,850	,,	June 11	8	Gas Light and Coke — 3 p.c. Con. Deb.	72½—74½	4 0 6	..
130,000	,,	,,	10	Gas Light and Coke — 10 p.c. Bonds	..	—	..
258,740	Stk.	Mar. 12	5	Hastings & St. L. 3½ p.c.	87—89	5 12 4	..
70,000	10	April 29	11	Hongkong & China, Ltd.	16½—16⅝	6 11 4	..
—	—	—	—	Hornsey 7 p.c.	..	—	..
131,000	Stk.	Mar. 12	7½†	Ilford A and C	151—154	5 2 4	..
65,780	,,	,,	6⅜†	Do. B	115—118	5 8 0	..
65,500	,,	June 26	4	Do. 4 p.c. Deb.	92—94	4 5 1	..
4,940,000	Stk.	May 14	9	Imperial Continental	150—160	5 12 6	..
1,235,000	Stk.	Feb. 12	3½	Do. 3½ p.c. Deb. Red.	84—86	4 1 5	..
200,342	Stk.	Mar. 12	6½	Lea Bridge Ord. 5 p.c.	119—121	5 7 5	95
561,000	Stk.	Feb. 26	10	Liverpool 5 p.c. Ord. A	211—213	4 13 11	..
718,100	,,	,,	7	Liverpool 5 p.c. Ord. B	146—14	4 14 7	..
306,083	,,	June 26	4	Do. 4 p.c. Pr. Deb. Stk.	..	—	—

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices. July 30.	Yield on Highest Closing Price.	Lowest and Highest Prices of Bargains.
£			p.c.			£ s. d.	
75,000	5	June 11	6	Malta & Mediterranean	4⅛—4⅜	6 9 9	..
250,000	100	April 1	4½	Met. of Melbourne — 4½ p.c. Deb.	99—101	4 9 1	..
541,930	20	May 28	4	Monte Video, Ltd.	11½—12	6 13 4	..
1,775,892	Stk.	July 29	4½	Newc'tle&G'tesh'd Con.	98½—99½	4 10 6	..
529,705	Stk.	June 26	3½	Do. 3½ p.c. Deb.	82—83	4 4 10	..
55,940	10	Feb. 26	7/14/0	North Middlesex 7 p.c.	14—16	5 2 8	..
800,000	Stk.	May 14	8	Oriental, Ltd.	117—122	6 11 3	..
60,000	5	Mar. 26	10	Ottoman, Ltd.	7⅛—7⅜	6 9 0	..
60,000	50	Feb. 26	13	Portsea, Island B	128—131	4 19 3	..
100,000	50	,,	12	Do. C	118—121	4 19 2	..
52,000	50	,,	10	Do. D	..	—	..
249,980	5	April 29	8	Primitiva Ord.	5½—6	6 13 4	..
499,960	5	June 26	5	,, 5 p.c. Pref.	4⅝—5	5 0 0	..
521,600	100	June 2	4	,, 4 p.c. Deb.	91—93	4 6 0	..
—	—	—	—	,, ,, ,, 1911	..	—	..
346,198	Stk.	June 26	4	River Plate 4 p.c. Deb.	85—87	4 12 0	..
150,000	10	May 14	6	San Paulo — 6 p.c. Pref.	10¾—11	5 9 1	..
125,000	50	July 1	5	San Paulo — 5 p.c. Deb.	47—49	5 2 0	..
135,000	Stk.	Mar. 12	10	Sheffield A	223—224	4 9 3	..
209,984	,,	,,	10	Do. B	222—224	4 9 8	..
523,500	,,	,,	10	Do. C	220—222	4 10 1	..
90,000	,,	May 28	9	South African	10¾—11½	7 16 6	..
6,429,895	Stk.	Feb. 12	5/4/0	South Met., 4 p.c. Ord.	111—113	4 16 8	82½—84
1,895,445	,,	July 10	3	Do. 3 p.c. Deb.	72½—74½	4 0 6	59—60
209,820	Stk.	Feb. 26	8½	South Shields Con. Stk.	157—159	5 6 11	..
952,795	Stk.	Feb. 26	6	S'th Suburb'n Ord. 5 p.c.	114—116	5 8 5	..
60,000	,,	,,	5	Do. 5 p.c. Pref.	110—112	4 9 3	..
—	—	,,	—	Do. West Kent.	..	—	..
137,058	,,	June 26	5	Do. 5 p.c. Deb. Stk.	116—118	4 4 9	90—90½
629,740	Stk.	May 14	5	Southampton Ord.	99—102	4 18 0	..
120,000	Stk.	Feb. 12	7½†	Tottenham — A 5 p.c.	135—138	5 8 8	..
742,275	,,	,,	6†	Tottenham — B 3½ p.c.	115—117	5 2 7	103½—104
181,255	,,	June 26	4	Tottenham — 4 p.c. Deb.	87—89	4 9 11	..
182,380	10	Dec. 30	5	Tuscan, Ltd.	5—6	8 6 8	..
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	93—95	5 5 3	..
236,476	Stk.	Mar. 12	5	Tynemouth, 5 p.c. max.	108½—109½	4 11 4	..
				Wandsworth, Wimbledon, and Epsom—			
80,000	Stk.	Feb. 26	8⅜	Wandsworth A 5 p.c.	151—156	5 7 4	..
255,636	,,	,,	6⅞	,, B 3½ p.c.	129—134	5 2 7	..
108,075	,,	,,	5/17/8	,, C 3½ p.c.	110—115	5 2 0	..
352,000	,,	,,	6½	Wimbledon 5 p.c.	117—122	5 0 5	..
98,000	,,	,,	6⅝	Epsom 5 p.c.	121—126	5 5 2	..
88,416	,,	June 26	3	3 p.c. Deb. Stk.	66—69	4 6 11	..

The Manchester Gas Committee have purchased a special vehicle to deliver gas fires and cookers, which uses coke as fuel, instead of petrol.

At a Huddersfield auction sale, £436 of stock in the Longwood and Slaithwaite Gas Company was recently disposed of at the rate of £96 10s. per cent.

During a discussion by the Cardiff Water Committee on the need for economy in consumption on the part of the public, Mr. Jenkins remarked that the people they wanted to get at were those who poured out tons of water to produce a "fancy cabbage or a sprout." What he called them was "mad gardeners."

About 572 members of the Gas-Workers and General Labourers' Union were affected by the South Wales coal strike last week. The Executive have since authorized a distribution of lock-out pay at the rate of 1s. 8d. per day to all who had been idle more than two days.

One of the two main pipes which convey water from the reservoirs at Elan Valley, Rhayader, to Birmingham, burst near Knighton, in the early hours of last Saturday week. The accident occurred near the drive gates to Stanage Castle, and at a point where the main runs parallel with the Knighton-Ludlow main road. Tons of soil were moved, and the water rushed on to the main road, damaging the surface some distance, and eventually finding its way to the River Teme.

WANTED, FOR SALE, CONTRACTS, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Appointments, &c., Vacant.

METER INSPECTOR AND SLOT COLLECTOR. No. 6071.

Plant, &c. (Second-Hand), for Sale.

SCRAP METAL. Harrogate Gas Company.

Meetings.

BRENTFORD GAS COMPANY. St. Ermin's Hotel, Westminster. Aug. 6. 2.30 o'clock.

COLNE VALLEY WATER COMPANY. Offices, New Bushey. Aug. 10. Two o'clock.

GAS LIGHT AND COKE COMPANY. Chief Office. Aug. 6. Twelve o'clock.

SOUTH SUBURBAN GAS COMPANY. De Keyser's Hotel. Aug. 13. Three o'clock.

TENDERS FOR

Coal.

HAVERFORDWEST CORPORATION. Tenders by Aug. 16.

HAVERHILL URBAN DISTRICT COUNCIL. Tenders by Aug. 10.

Tar.

CLEATOR MOOR URBAN DISTRICT COUNCIL. Tenders by Aug. 20.

MANSFIELD GAS DEPARTMENT. Tenders by Aug. 4.

NOTICES TO CORRESPONDENTS, ADVERTISERS, AND SUBSCRIBERS.

No notice can be taken of anonymous communications. Whatever is intended for insertion in the "JOURNAL" must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

BANK HOLIDAY.

In consequence of the BANK HOLIDAY, Communications for the next issue of the "JOURNAL" and Orders respecting ADVERTISEMENTS should be received at the Office

NOT LATER than the FIRST POST ON SATURDAY.

Wanted, For Sale, and Tender Advertisements, Six Lines and under, 3s.; each additional Line, 6d.

TERMS OF SUBSCRIPTION to the "JOURNAL."

United Kingdom: One Year, 21s.; Half Year, 10s. 6d.; Quarter, 6s. 6d.

Payable in advance. If credit is taken, the charge is 25s. a year.

Abroad (in the Postal Union): £1 7s. 6d., payable in advance.

All Communications, Remittances, &c., to be addressed to WALTER KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

Telegrams: "GASKING, FLEET LONDON." Telephone: Holborn 6857.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 171, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

FOR

DRY METERS

TRY

JAMES MILNE AND SON, LIMITED.

SEND your inquiries for Carburetted HYDROGEN AND BLUE WATER-GAS PLANT, also TAR DEHYDRATING PLANT and other GAS-WORKS APPARATUS to—

BALE AND HARDY,

39, VICTORIA STREET, WESTMINSTER, S.W.

D. ANDERSON AND COMPANY,
GAS LIGHTING ENGINEERS AND CONTRACTORS.
18 & 20, FARRINGDON ROAD, LONDON, E.C.
Telegrams: "DACOLIGHT LONDON." Telephone: 2336 HOLBORN.

ENQUIRIES SOLICITED.

FOR Gas-Works Plant of Every Description; also SULPHATE OF AMMONIA and SULPHUR RECOVERY PLANTS.

C. & W. WALKER, LIMITED,
DONNINGTON, NEWPORT, SALOP.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, London, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams—
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB LONDON."

FOR

PREPAYMENT METERS

TRY

JAMES MILNE AND SON, LIMITED.

SULPHURIC ACID.

SPECIALLY prepared for Sulphate of AMMONIA Makers by

CHANCE AND HUNT, LIMITED.

Works: OLDBURY, WEDNESBURY, AND STAFFORD.
Address Correspondence and Inquiries to OLDBURY, WORCS.
Telegrams: "CHEMICALS, OLDBURY."

HUTCHINSON BROTHERS, Ltd.,
FALCON WORKS, BARNSLEY.

MANUFACTURERS OF
GAS METERS (Ordinary and Prepayment),
"FALCON" INVERTED LAMPS and SQUARE LANTERNS for Street Lighting,
INVERTED BURNERS and CONVERSION SETS for Street Lamps.

SULPHURIC ACID.

SPECIALLY prepared for the manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD.,
with which is amalgamated WM. PEARCE & SONS, LTD.,
6, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, FEN, LONDON."
Telephone: 1588 AVENUE (3 lines).

OXIDE OF IRON.

We are in a position to Supply Oxide of Iron promptly, and invite Enquiries.
SPENT OXIDE WANTED.

BALE & CHURCH, LTD.
5, CROOKED LANE, LONDON, E.C.

"TORTO" FIRE CEMENT.

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5, CROOKED LANE, LONDON, E.C.

"KLEENOFF," THE COOKER CLEANSER.
Tins for sale to Consumers.
In Bulk for Works Use.

BALE & CHURCH, LTD.
5, CROOKED LANE, LONDON, E.C.

ALDER AND MACKAY
(ESTABLISHED 1850).

WET AND DRY METERS.
SLOT AND ORDINARY.
STREET LAMPS AND AUTOMATIC CONTROLLERS.

EDINBURGH.

SPENCER'S PATENT HURDLE GRIDS.

THE very best Patent Grids for Holding Oxide Lightly.

See Illustrated Advertisement, May 11, p. 314.

TAR WANTED.

THOMAS HORROCKS & SONS, LTD.,
Albert Chemical Works,
NORTON STREET, MILES PLATTING, MANCHESTER.
Pitch, Creosote, Brick and Fuel Oils, Benzol, Solvent Naphtha, Carbolic, Lysol, Sulphate of Ammonia.

SULPHATE OF AMMONIA SATURATORS and all LEAD and TIMBER WORK in Connection with Sulphate Plants.
We Guarantee promptness with efficiency for Repairs.
JOSEPH TAYLOR AND CO., CENTRAL PLUMBING WORKS, BOLTON.
Telegrams: "SATURATORS BOLTON," Telephone 0848.

ROBERT DEMPSTER & SONS, Ltd., Contractors for Complete CARBONIZING PLANTS and every Description of GAS APPARATUS, ELEVATING, CONVEYING, and TELPHERAGE PLANTS, also STOKING MACHINERY, ROSE MOUNT IRONWORKS, ELLAND.

FOR

ALL METERS

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JAMES MILNE AND SON, LIMITED.

PATENTS AND TRADE MARKS PUBLICATIONS: "MERCHANDISE MARKS ACT, and Decisions thereunder," 1s.; "TRADE SECRETS v. PATENTS," 6d.; "DOCTRINE of EQUIVALENTS, Mechanical and Chemical," 6d.; "SUBJECT-MATTER of PATENTS," 6d.
MEWBURN, ELLIS, & PRYOR, Chartered Patent Agents, 70 & 72, Chancery Lane, London, W.C. Telegrams: "Patent London." Telephone: No. 243 Holborn.

J. E. C. LORD, Ship Canal Tar-Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.

TAR WANTED.

JOSEPH A. HUTCHISON, LIMITED, HIGHBRIDGE WHARF, SOMERSET.

GAS-WORKS requiring Extensions should Communicate with FIRTH BLAKELEY, SONS, AND CO., LIMITED, Dewsbury, who make a Speciality of Catering for the Smaller Gas Concerns. Prices Reasonable; quality and results, the best. Satisfaction Guaranteed.

TAR WANTED.

THE Burnden Tar Company (Bolton), Ld. HULTON CHEMICAL WORKS, BOLTON.

GAS PLANT for Sale—We can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. Compare Prices and Particulars before ordering elsewhere.
FIRTH BLAKELEY, SONS, AND COMPANY, LIMITED, Church Fenton, near LEEDS.

"GAZINE" (Registered in England and Abroad). A radical Solvent and Preventative of Naphthalene Deposits, and for the Automatic Cleaning of Mains and Services.
It is also used for the Enrichment of Gas.
Manufactured and Supplied by C. BOURNE, West Moor Chemical Works, KILLINGWORTH, or through his Agents, F. J. NICOL & Co., Pilgrim House, NEWCASTLE-ON-TYNE.
Telegrams: "DORIC," Newcastle-on-Tyne. National Telephone No. 2497.

RICHARDSON'S

"PLUTONIC" FIRE CEMENT.

(Powder or Paste).
For Gas Retort and Furnace Repairs, &c.
(42nd Year of Sale).
Prices and Samples free on Application.
THE "PLUTONIC" CEMENT COMPANY,
Telegrams: 62, BISSELL STREET,
"PLUTONIC, BIRMINGHAM." BIRMINGHAM.

JOHN RILEY & SONS, Limited, Chemical Manufacturers, Hapton, near Accrington, are MAKERS of Special SULPHURIC ACID, for Sulphate of Ammonia Making. Highest percentage of Sulphate of Ammonia obtained from the use of this Vitriol, which has now been used for upwards of 50 years. References given to Gas Companies.

"PENLITE"—The smallest efficient Torch on the Market. Exact reproduction of a Fountain Pen, with Clip for Vest Pocket. Nickel Plated 3s. 6d., Refills 1s., post free.
STARLITE COMPANY, 79, Wiltshire Road, Brixton, LONDON, S.W.

"FRANCO," a wonderful new Process, Semi-Dry Battery for Pocket Flash Lamps. Guaranteed 5 Hours' Light. Standard size 9s. per doz. Try a Sample. Our list of Pocket Lamps, Torches, &c., now ready.
STARLITE COMPANY, 79, Wiltshire Road, Brixton, LONDON, S.W.

ROCHESTER, CHATHAM, AND GILLINGHAM GAS COMPANY.

APPLICANTS for the Post of Assistant SUPERINTENDENT for the Gillingham Station of the above Company are THANKED and Informed that THE VACANCY IS NOW FILLED.

METER Inspector and Slot Collector Wanted for a Gas-Works in the East of Scotland.
Apply, by letter, stating Wage required, to No. 6071, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

WANTED—Good, Clean, and Hard CARBON, in Four Ton Lots, or more, f.o.r.
Address, No. 6072, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

STEAM-ENGINES and Exhausters COMBINED—120,000 per Hour Capacity. Seen Running by Appointment. £150 each to effect Immediate Sale. Guaranteed Working Order.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, LEEDS.

CONDENSERS.—One set of Four An- nular. Nearly new and Perfect. 10-inch Bye-Pass complete. £100 on Rails to save Removal home.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, LEEDS.

PURIFIERS.—Set of Four 10 feet Square. Centre Valve and Connections. All Good. Delivered on Rails for £200 Cash, or Refixed if required.
FIRTH BLAKELEY, SONS, AND CO., LTD., CHURCH FENTON, LEEDS.

GASHOLDER, very strong, nearly new, 250,000 Capacity. Removing solely on account of Defective Tank. Will sell per Ton ready for Erection, or Quote Delivered and Erected. New Steel Tank if required.
Address No. 6070, care of Mr. KING, 11, Bolt Court, FLEET STREET, E.C.

SCRAP METAL FOR SALE.

THE Harrogate Gas Company have FOR SALE a large quantity of SCRAP METAL, and invite Quotations.
For Particulars, apply to the undersigned, or to the Engineer at the Gas-Works, Ripon Road, Harrogate.
H. WILKINSON,
Secretary and General Manager.
Gas Office, James Street,
Harrogate.

THE Cleator Moor Urban District Council invite OFFERS for the Surplus TAR produced at their Gas-Works during the Year ending Aug. 31, 1916.
Endorsed Tenders to be Delivered to the undersigned on or before Aug. 20, 1915.
HENRY ROTHERY,
Clerk to the Council.
Public Offices, Cleator Moor,
July 20, 1915.

MANSFIELD CORPORATION.
(GAS DEPARTMENT.)

THE Gas Committee of the above Cor- poration are prepared to receive TENDERS for the Sale of the Surplus TAR for the ensuing Twelve Months.
Tenders to be sent not later than 10 a.m. on Wednesday, the 4th of August, endorsed "Tender for Tar," to J. Harrop White, Esq., Town Clerk, Mansfield.
Any further Particulars may be obtained from the undersigned.
W. J. RENDELL BAKER,
Engineer and Manager.
July 22, 1915.

CORPORATION OF HAVERFORDWEST.

COAL.

TENDERS are invited for the Supply of about 1600 Tons of Double Screened GAS COAL of the Very Best Quality, to be Delivered at the Haverfordwest Railway Station, or at the Gas-Works Quay, Haverfordwest, by Water Communication, in Quantities as required by the Gas Manager during the Year commencing on the 1st of September next for the Corporation of Haverfordwest.
Tenders by Aug. 16.
Forms of Tender and further Particulars of
R. T. P. WILLIAMS,
Town Clerk.
Haverfordwest, July 27, 1915.

HAVERHILL URBAN DISTRICT COUNCIL.

TENDERS FOR COAL.

THE Haverhill Urban District Council invite TENDERS for the Supply of 800, 1400, or 2000 Tons of Best GAS COAL (Screened or Unscreened), to be Delivered free at the Haverhill (Great Eastern Railway) Station in such Quantities and at such Periods as may be ordered from time to time between the 1st day of September next and the 31st day of August, 1916.
No Form of Tender is provided, nor will be supplied.
The Council reserve the right to divide the Contract as they think fit, and do not bind themselves to accept the lowest or any Tender.
Sealed Tenders, endorsed "Gas," to be Delivered to me on or before the 10th of August, 1915.
JAMES BEASLEY,
Clerk.
Haverhill, Suffolk,
July 24, 1915.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office, on Friday, the 6th day of August next, at Twelve o'clock (noon) precisely, to transact the usual Business, including the Declaration of a Dividend for the Half Year ending on the 30th day of June last.
By order,
HENRY RAYNER,
Secretary.
Chief Office, Horseferry Road,
Westminster, S.W., July 19, 1915.

SOUTH SUBURBAN GAS COMPANY.

NOTICE is Hereby Given, that the ORDINARY HALF-YEARLY MEETING of the Proprietors of this Company will be held at the De Keyser's Royal Hotel, Victoria Embankment, London, E.C., on Friday, the 13th day of August, 1915, at Three o'clock in the afternoon precisely, to receive the Report of the Directors and Statement of Accounts for the Half Year ended June 30 last; to declare a Dividend for the same period; and for General Purposes.
Dated this 20th day of July, 1915.
The TRANSFER BOOKS WILL BE CLOSED from the 30th of July to the 13th of August, both days inclusive.
By order of the Board,
WILFRID WASTELL,
Secretary.
Offices and Works,
Lower Sydenham, S.E.,
July 20, 1915.

BRENTFORD GAS COMPANY.

NOTICE is Hereby Given that a Half- YEARLY ORDINARY GENERAL MEETING of the Proprietors will be held at the St. Ermin's Hotel, Caxton Street, Westminster, on Friday, the 6th of August next, at Half-past Two o'clock precisely, to Transact the usual Business, including the Declaration of a Dividend for the Half Year ending the 30th day of June last.
By order,
JOHN T. CROXFORD,
Secretary.
Office, Brentford,
July 22, 1915.

COLNE VALLEY WATER COMPANY.

NOTICE is Hereby Given that the EIGHTY-THIRD HALF-YEARLY GENERAL MEETING of the Proprietors of the Company will be held at the Company's Offices, New Bushey, Watford, on Tuesday, Aug. 10, 1915, at Two o'clock p.m. precisely to consider the Directors' Report; to declare a Dividend; and to transact the Ordinary Business of the Company.
The TRANSFER BOOKS WILL BE CLOSED from the 28th of July to the 10th of August, both days inclusive.
Dated this 16th day of July, 1915.
C. P. SINCLAIR,
Secretary and General Manager.
New Bushey, Watford.

EUROPEAN GAS COMPANY, LIMITED.

SHARE WARRANTS TO BEARER.

NOTICE is Hereby Given that, in accordance with a Resolution passed at the Annual General Meeting of Shareholders held on the 20th inst., a DIVIDEND of 10s. per share WILL BE PAYABLE, on and after the 31st inst., on the above Shares, subject, however, to a deduction of 6d. per Share for French Stamp and Transfer Duty.
Payment will be made at the Union of London and Smith's Bank, Limited, 2, Princes Street, London, E.C., after Serial Coupon No. 81 has been left Three Clear Days for Examination.
W. B. BRADY,
Secretary.
Finsbury House, Blomfield Street,
London, E.C., July 20, 1915.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MESSRS. A. & W. RICHARDS beg to notify that their SALES BY AUCTION of NEW CAPITAL ISSUED UNDER PARLIAMENTARY POWERS, and of STOCKS and SHARES belonging to EXECUTORS and other PRIVATE OWNERS in LONDON, SUBURBAN, and PROVINCIAL GAS and WATER COMPANIES, take place PERIODICALLY at the Mart, TOKENHOUSE YARD, E.C.
Terms for Issuing New Capital, and also for including other Gas and Water Stocks and Shares in these Periodical Sales, will be forwarded on Application to MESSRS. A. & W. RICHARDS, at 37, WALBROOK, E.C.

THOMAS TURTON AND SONS, LIMITED,
SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.
SCREW STOCKS, TAPS AND DIES,
SPANNERS, RATCHET BRACES, LIFTING JACKS,
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